VOLUME 5 NUMBER 4

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A DESCRIPTION OF SOME DISSECTIONS OF THE INTERNAL CAPSULE, THE CORONA RADIATA AND THE THALAMIC RADIATION TO THE TEMPORAL LOBE *

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In the early years of the nineteenth century, dissection of the brain was practiced with great success by such men as Burdach and Reil, who were able to trace some of the larger fiber tracts in alcohol-hardened brains. But with the introduction of more refined methods, attention was diverted to the study of serial sections under the microscope, and for many years no effort was made to trace fiber bundles by mechanical dissociation. Recently there has been a revival of interest in this method of study. It has been found that in formaldehyd-hardened material bundles of fibers can be followed with ease and the outline of nuclear masses readily determined. Johnston [1] and Hoeve [2] advocated fiber tract dissection as a part of the laboratory course in neuro-anatomy, and in 1909 Curran,[3] using this method, discovered a bundle of association fibers in the cerebrum, extending from the frontal into the occipital lobe along the inferior border of the lateral surface of the lentiform nucleus. To this tract he gave the name fasciculus occipitofrontalis inferior.

In making the dissections here described, the technic advocated by Curran has been followed. In removing nuclear masses to display fiber tracts which run through or beneath them, it is desirable to let a stream of water play over the specimen while the dissection is in progress. This serves to wash away the nuclear material as it is broken up and makes it much easier to display the fiber bundles.

The shape of the internal capsule and its relation to the basal ganglions can be studied to particular advantage in dissections prepared for this purpose. It is very difficult to form, from a study of serial sections, a clear cut mental picture of these structures in their entirety, and for

* Contribution 82, from the Anatomical Laboratory of Northwestern University Medical School, Jan. 6, 1918.

1. Johnston, J. B.: Anat. Record **2**:344, 1908.
2. Hoeve, H. J. H.: Anat. Record **3**:247, 1909.
3. Curran, E. J.: J. Comp. Neur. **19**:645, 1909.

this reason preparations which show their true form and relations are particularly instructive. A reconsideration of the anatomy of the internal capsule seems desirable because no articles dealing with this subject have appeared in the last twenty years, and the descriptions found in most textbooks are very unsatisfactory. A good account was given by Dejerine,[4] but this is difficult to follow because it is based entirely on the study of sections and gives no view of the internal capsule as a whole.

DESCRIPTION OF DISSECTIONS

By removing the insula, along with the more lateral portions of the frontal, temporal and occipital lobes, one can readily expose the corona radiata, external capsule, fasciculus occipitofrontalis inferior and the fasciculus uncinatus as shown by Figure 2 in another article in this issue.[5] The outline of the lentiform nucleus is clearly visible beneath

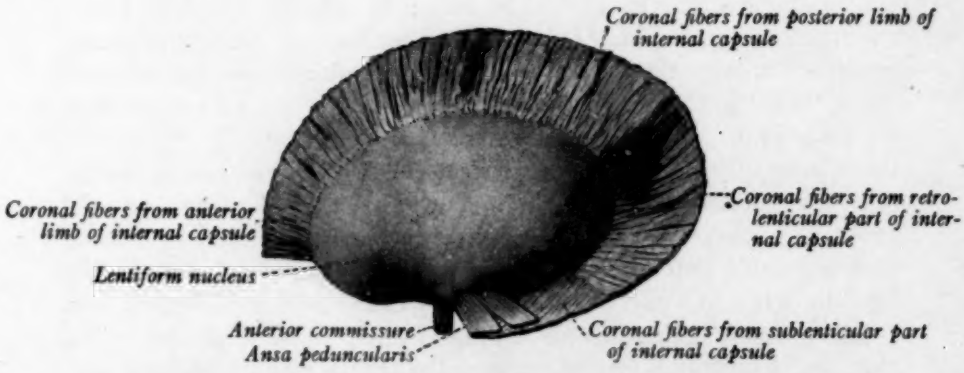
Coronal fibers from posterior limb of internal capsule
Coronal fibers from anterior limb of internal capsule
Coronal fibers from retrolenticular part of internal capsule
Lentiform nucleus
Anterior commissure
Ansa peduncularis
Coronal fibers from sublenticular part of internal capsule

Fig. 1.—Lateral view of the lentiform nucleus and the corona radiata dissected free from the left cerebral hemisphere (from Ranson's Anatomy of the Nervous System).

the external capsule. There is a very definite plane of cleavage between the fiber bundles shown in this figure and those more superficially placed. This makes the dissection easy except in that part of the corona radiata which lies above and anterior to the lentiform nucleus. Here the fibers intersect with those from the corpus callosum and are not easily followed. The bed of fibers exposed in the dissection below and behind the lentiform nucleus is quite sharply separated from the more superficial white substance and includes both the internal and external sagittal strata of the occipital lobe.

When the uncinate and inferior occipitofrontal fasciculi have been removed and the external capsule stripped away, the lentiform nucleus is

4. Dejerine, J.: Anatomie des Centres Nerveux **2**:19, 1901.

5. Davis, L. E.: Anatomical Study of Inferior Longitudinal Fasciculus, this issue, p. 370).

exposed. Its shape is well shown in Figure 1. The corona radiata is seen emerging from the internal capsule which lies medial to this nucleus. It is a broad band of radiating fibers and forms three-fourths of an ellipse surrounding the nucleus except for a short distance below and in front.

If now the lentiform nucleus is scraped away, the internal capsule will be exposed (Fig. 2). It presents an evenly concave lateral surface

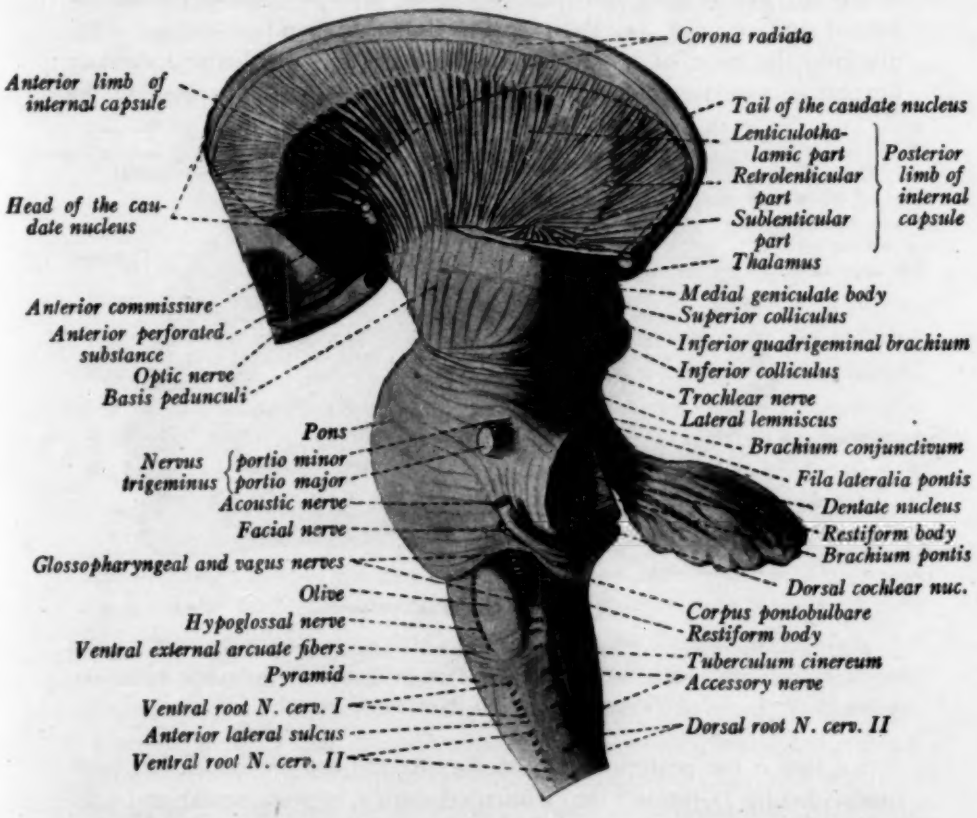

Fig. 2.—Lateral view of brain stem and internal capsule (from Ranson's Anatomy of the Nervous System).

within which the lentiform nucleus is received. There is no sharp bend in this surface to correspond to the genu, the position of which cannot be identified on this side of the internal capsule. There is, however, a rather sharp curved ridge around the border of the concave lenticular impression, and this ridge marks the transition of the internal capsule into the corona radiata. The majority of the fibers of the corona radiate forward, upward and backward in a nearly vertical plane to intersect with the radiation of the corpus callosum beyond the convex border of

the caudate nucleus; but the lowermost coronal fibers are directed lateral into the temporal lobe (Fig. 1).

The corona radiata has been partly cut away in Figure 2, so as to show the convex border of the caudate nucleus. This nucleus is for the most part hidden behind the internal capsule and the remains of the corona radiata. The outline of the hidden part is indicated by a dotted line. As this dotted line curves upward and backward over the lenticular surface of the internal capsule, it marks the position of the genu which appears as a curved ridge when the capsule is viewed from the medial surface (Fig. 3). Between this dotted line and the curved ridge marking the edge of the lenticular impression is the lenticulocaudate portion or anterior limb of the internal capsule (Fig. 2). Behind the

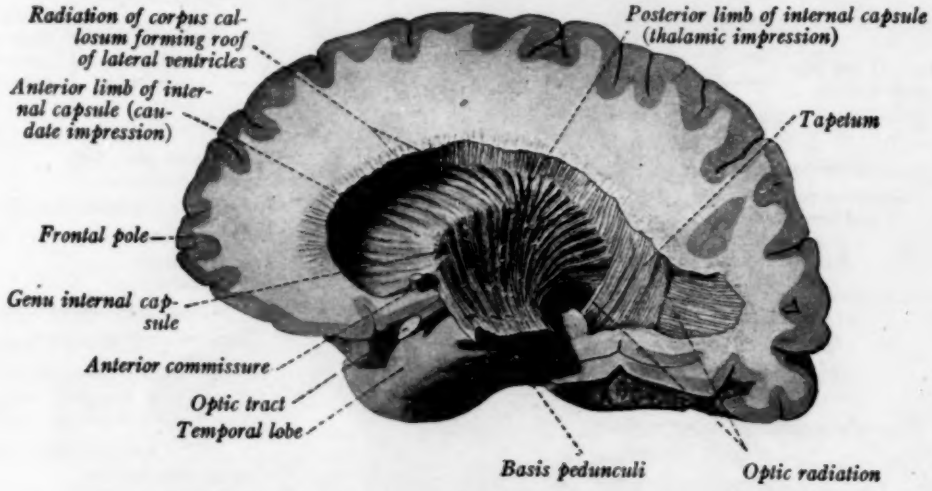

Fig. 3.—Dissection of cerebral hemisphere, showing the internal capsule exposed from the medial side. The caudate nucleus and thalamus have been removed (from Ranson's Anatomy of the Nervous System).

dotted line is the posterior limb of the internal capsule which has been subdivided by Déjerine [4] into lenticulothalamic, retrolenticular and sublenticular portions. The figure shows very well the direct continuity of the internal capsule with the basis pedunculi on the one hand and the corona radiata on the other.

An instructive view of the internal capsule can be obtained from the medial side by opening up the lateral ventricle and scraping away the thalamus and caudate nucleus. Each of these nuclear masses makes a distinct impression on the medial surface of the capsule, and between the two is a prominent curved ridge (Fig. 3). In horizontal sections through the brain at appropriate levels, this ridge appears as a sharp angle between the anterior and posterior limbs of the internal capsule

and is known as the genu. This genual ridge follows the line of the sulcus which separates the thalamus from the caudate nucleus in the floor of the lateral ventricle and which contains the stria terminalis. Figure 3 shows why the shape of the internal capsule and the position and prominence of the genu vary as they do in horizontal sections taken at different levels through the basal ganglions.

The caudate impression corresponds in outline to the shape of the nucleus which produces it. Where the head of the nucleus rests on the capsule, the impression is large, and as the nucleus tapers to form the long curved tail, the caudate impression also becomes narrow.

The thalamic impression is markedly concave and belongs entirely to the posterior limb of the capsule. Below, it goes over without sharp line of demarcation into the posteromedial surface of the basis pedunculi at about the level of the optic tract. Above, it is limited by the curved ridge of the genu. The width of this portion of the capsule increases steadily from below upward. Its anterior border is continuous with the anteromedial border of the basis pedunculi. At its upper extremity a short distance behind the anterior commissure, this border bends forward at a rather sharp angle to become continuous with the inferior border of the anterior limb. The entire thalamic surface of the internal capsule as seen after removal of the thalamus and subthalamus is shaggy in appearance, due to the presence of innumerable fibers of the thalamic radiation which were broken off when the thalamus was removed.

The anterior limb, pars frontalis, or lenticulocaudate portion of the internal capsule, consists in part of fibers from the medial portion of the basis pedunculi (frontopontine tract) which curve forward over the anterior commissure and run a more or less horizontal course toward the frontal lobe. But the majority of the fibers belong to the frontal stalk of the thalamus which is also directed horizontally forward. This segment of the internal capsule has a sickle-shaped outline and presents a distinct lower border beneath which the caudate and lentiform nuclei are fused together (Fig. 2). Its other two borders are curved with convexity forward and upward. Of these the anterosuperior border presents the greater curvature and corresponds to the anterior part of the ridge between the internal capsule and corona radiata. The posterior inferior border is indicated in Figure 2 by a dotted line which corresponds to the position of the genual ridge. These two borders meet in an acute angle which points toward occiput.

Horizontal sections through the internal capsule above the level of the anterior commissure cut through the thalamus as well as the genu and both limbs of the internal capsule. Such sections pass through what Déjerine [4] has called the thalmic region of the internal capsule.

Sections through the anterior commissure or immediately below it pass through both the thalamus and subthalamus, since the latter is situated in front of, as well as below, the former. Such sections are said to pass through the subthalamic region of the internal capsule. They do not include either the genu or the anterior limb.

The posterior limb of the internal capsule is more complex than the anterior and, as has already been said, consists of three parts: lenticulothalamic, retrolenticular and sublenticular. The lenticulothalamic portion includes that part of the lenticular surface which lies behind the curved line of the genual ridge (Fig. 2). Its fibers have for the most part a vertical direction. They belong to the corticobulbar, corticospinal, and corticorubral tracts and to the parietal stalk of the thalamus; and to these there are added in the subthalamic region the frontopontine tract from the anterior segment and the temporopontine fibers from the sublenticular segment. It is usually said that the fibers of the corticobulbar tract pass through the genu of the internal capsule. But since the genu is a curved ridge of considerable extent, it will be obvious that this statement can apply only to the genu as it is seen in horizontal sections through a particular region. According to Déjerine the corticobulbar tract passes through the genu in the inferior one-third of the thalamic region.

The retrolenticular segment of the internal capsule lies behind the lentiform nucleus on the lateral surface of the thalamus. It consists of fibers from the pulvinar, which are at first directed horizontally outward behind the lentiform nucleus and then turn sharply backward to run over the lateral surface of the tail of the caudate nucleus toward the occipital lobe. They form the optic radiation.

The sublenticular part of the internal capsule extends laterad beneath the lentiform nucleus (Figs. 1 and 2), and helps to form the roof of the inferior horn of the lateral ventricle. It is composed of fibers which enter it from the lateral part of the basis pedunculi (the temporopontine tract) and of fibers uniting the thalamus with the temporal lobe. The latter group of fibers had been dissected away in the preparation from which Figure 2 was drawn, and only the temporopontine fibers are illustrated. They spread out on the upper surface of the sublenticular segment immediately beneath the lentiform nucleus and are directed nearly horizontally laterad into the temporal lobe. Traced in the other direction in the dissected specimen, they can be seen to turn downward and backward into the lateral part of the basis pedunculi.

Beneath this layer of temporopontine fibers is another composed of fibers joining the thalamus with the temporal lobe. These fibers sweep forward and laterad under cover of the temporopontine tract which has been removed in Figure 1, in order to display them. There are

thus two distinct strata in the sublenticular segment, the upper of which is composed of laterally directed temporopontine fibers while the lower belongs to the thalamic radiation to the temporal lobe and has its fibers directed forward and laterad.

In this article, we are especially concerned with those portions of the thalamic radiation which go to the temporal lobe. The ventral stalk or inferior peduncle of the thalamus, also known as the ansa peduncularis (Fig. 1) springs from the basal aspect of the anterior part of the thalamus and runs behind the anterior commissure under the posterior end of the anterior limb of the internal capsule and then laterad beneath the lentiform nucleus to the insula and temporal lobe. In addition to this well known bundle, there are other fibers connecting the thalamus with the temporal lobe. Degenerations resulting from experimental lesions in the brains of monkeys have shown, according to Probst,[6] that thalamotemporal fibers run through the posterior part of the internal capsule to the cortex of the superior temporal gyrus. Some of these fibers are said by him to leave the internal capsule above the lentiform nucleus and run through the external and extreme capsules to the superior temporal gyrus.

But by far the largest bundle of fibers joining the thalamus with the temporal lobe is the temporothalamic fasciculus of Arnold,[7] which we have already encountered in the sublenticular segment of the internal capsule (Fig. 1). This bundle emerges from the ventrolateral part of the posterior extremity of the thalamus under cover of the external geniculate body. The fibers form a large strand directed forward in the inferior of the two layers of the sublenticular segment of the internal capsule along the roof of the inferior horn of the lateral ventricle. Here a few at a time they curve outward and then somewhat backward into the white matter of the temporal lobe. Thus as they spread out toward their distribution, the fibers describe broad curves with convexity forward. The most medial of these fibers extend farthest forward reaching the anterior extremity of the roof of the inferior horn before they curve outward and backward toward their distribution (Fig. 4). The fasciculus of Arnold must not be confused with the fibers from the medial geniculate body, which constitute the auditory radiation and which are mingled with the temporopontine tract in the sublenticular segment of the internal capsule.

Another bundle of thalamotemporal fibers seems to have been overlooked by nearly all previous investigators. The constituent fibers of this fascicula can be traced from the stratum zonale on the dorsal sur-

6. Probst, M.: Sitzungsb. d. k. Akad. d. Wissensch. Math.-natur. w. Wien. **114**:173, 1905.

7. Arnold, A.: Handbuch der Anatomie des Menschen **2**: 1851.

face of the posterior part of the thalamus. They are gathered into a compact bundle along the medial side of the stria terminalis. The bundle arches backward, then downward, and finally forward around the posterior extremity of the thalamus following the tail of the caudate nucleus into the roof of the inferior horn of the lateral ventricle (Fig. 4). In its arched course around the thalamus it lies on the medial side and partly under cover of the stria terminalis. Passing through the sublenticular portion of the internal capsule, the bundle flattens out in the roof of the inferior horn of the lateral ventricle under cover of the ependymal lining and can be traced forward to the anterior part of the temporal lobe. It lies on the ventricular surface of the temporothalamic fasciculus of Arnold between that bundle and the epen-

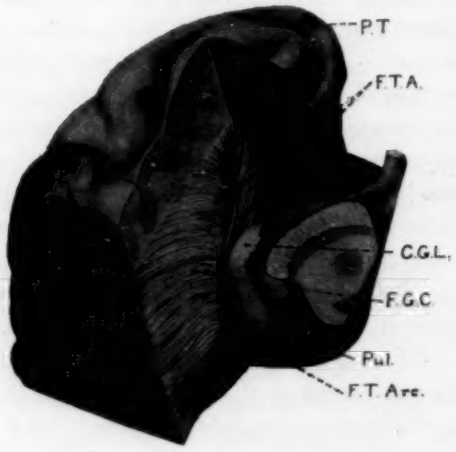

Fig. 4.—Dissection of the temporal lobe from below. The mesencephalon has been cut across at the level of the superior colliculus. The medial and inferior portion of the temporal lobe has been removed and the fibers of the corona radiata and sublenticular part of the internal capsule exposed: *C. G. L.*, corpus geniculatum laterale; *F. T. A.*, fasciculus temporothalamicus of Arnold and fasciculus thalamotemporalis arcuatus; *F. T. Arc.*, fasciculus thalamotemporalis arcuatus; *F. G. C.*, fasciculus geniculocalcarinus; *P. T.*, polus temporalis and *Pul.*, pulvinar.

dyma of the ventricle. In order to differentiate this bundle from that described by Arnold, it may be designated as the fasciculus thalamotemporalis arcuatus.

After these fibers from the stratum zonale had come to view in our dissections, a careful review of the literature was made to see if they had been described before. The only mention of them seems to be by Probst [6] in 1905. He traced them in the brain of a monkey after an

experimental lesion in the thalamus and internal capsule and regarded them as constituting an hitherto undescribed bundle which he designated in his drawings by the letter *y*. His description of this bundle corresponds exactly with that given herewith for the fasciculus thalamotemporalis arcuatus. The degeneration which he found in this fascicle resulting from a lesion in the thalamus indicates that at least a large part of these fibres are corticipetal. Probst states that he has also been able to demonstrate these fibers in the brains of microcephalic idiots where for some reason they stand out with special clearness.

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AN ANATOMIC STUDY OF THE INFERIOR LONGITUDINAL FASCICULUS *

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In the majority of anatomic textbooks the inferior longitudinal fasciculus is described as one of the cerebral association tracts. Its course is spoken of as extending between the poles of the occipital and temporal lobes. The exact anatomic relations of this bundle and the possibility that it represents projection fibers joining the thalamus with the cortex of the occipital and temporal lobes have caused a great difference of opinion among anatomists and neurologists. All observers to date are agreed that it consists of a well defined aggregation of nerve fibers. With two exceptions, all of the recent work on this subject has been done by examinations of serial sections, obtained from cases of cerebral softening or tumors, showing degenerative changes. It should be comparatively easy, however, to show by gross dissections of well hardened specimens, a bundle such as the fasciculus longitudinalis inferior.

In this work we have undertaken to settle by gross dissections of the cerebrum, these moot points with reference to this particular fasciculus: first, the course, extent and relations of the inferior longitudinal bundle, and second, whether or not this tract consists of projection or association fibers. Naturally, we assume in the beginning that such a bundle really exists as a distinct entity.

Reil [1] (1809) was the first to describe the inferior longitudinal bundle. He did not recognize it as such, but included it in his description of the corona radiata of the occipital lobe.

Burdach [2] (1822) identified the fasciculus longitudinalis inferior as a definite bundle and termed it an association tract. He describes it thus:

> In each hemisphere, it extends along the base of the corona radiata; the lower longitudinal fibers coursing in uninterrupted fashion from the pole of the occipital lobe. It forms, in the longitudinal direction, a prominent eminence upon the under surface of the cerebrum. It is somewhat curved longitudinally, arched externally and slightly concave laterally. It forms in its arch, a very level curve which corresponds to the external capsule and is contrasted

* Contribution 83, from the Anatomical Laboratory of the Northwestern University Medical School, Jan. 6, 1921.

1. Reil: Archiv für die Physiologie von Prof. J. C. Reil und Dr. J. H. F. Autenreith (Halle), quoted from Niessl-Mayendorf (Footnote 7).

2. Burdach: Von Bau und Leiten des Gehirns **1**:152, 1822, quoted from Niessl-Mayendorf (Footnote 7).

to the fasciculus uncinatus which is somewhat concave inferiorly and slightly convex superiorly. It begins in the pole of the occipital lobe and runs anteriorly along the external part of the floor of the inferior horn. In the temporal lobe, it courses somewhat externally and becomes the foundation of the outer wall or the external division of its floor, and bears the hippocampus. It forms a groove in which the corona radiata progresses. Its inner part forms the inner margin of this groove and unites with the tapetum and cingulum. Its outer part unites with the ground bundles which come up in the lateral border of the temporal lobe. A portion of the fibers run more obliquely, anteriorly and medially beneath the fasciculus uncinatus; and course onward beneath the lenticular nucleus to reach the island of Reil. They form the floor of the external capsule and curve somewhat externally and enter the frontal lobe where they course above the uncinate fasciculus and extend to the external side of the frontal pole.

It will be evident from Figure 2, which illustrates the dissection of the lateral aspect of the cerebrum, that Burdach has very accurately described the fasciculus occipitofrontalis inferior.

Gratiolet [3] (1839) says nothing of a long association bundle from the occipital to the temporal lobe. He describes, however, two divisions of the optic radiation, whose fibers intermingle in the occipital lobe and run forward to terminate within the external geniculate body, the pulvinar and the anterior corpora quadrigemina.

Sachs [4] (1892) believes the inferior longitudinal bundle to be a fasciculus of association fibers originating with the occipital lobe and terminating within the temporal lobe, especially in the first and second temporal convolutions. The inner portion of the tract is in close relation to the cingulum, while the fibers of the superior portion intermingle with those of the corona radiata. Sachs introduced the term "external sagittal stratum" in describing the superior fibers.

Dejerine [5] (1895) describes the bundle as a fasciculus of association fibers arising within the pole and entire cortex of the occipital lobe. Within the temporal lobe and at the level of the retrolenticular segment of the internal capsule, the inferior longitudinal bundle curves around the posterior extremity and the inferior border of the putamen, surrounds the sphenoidal horn and reaches the external part of the amygdaloid nucleus where with the fasciculus uncinatus they divide the gray substance of the neighboring cerebral cortex. Within the temporal lobe, the fibers of the inferior couch course within the hippocampal convolution, the fusiform lobe and the third temporal convolutions. A

3. Gratiolet: Anatomie comparée du système nerveux, Paris, 1839, quoted from Niessl-Mayendorf (Footnote 7).

4. Sachs, H.: Ueber Flechsig's Verstandescentren, Monatschr. f. Psychiat. u. Neurol. **1**:199, 1892.

5. Dejerine, J.: Anatomie des centres neuveux, quoted from Archambault (Footnote 11).

large number of fibers radiate within the first and second temporal convolutions. A small number of fibers enter into the constitution of the external capsule and intercross anteriorly with the fibers of the anterior commissure and the fasciculus uncinatus.

Flechsig[6] (1896) working on the myelinization of fibers, wrote about the bundle under the term "primary optic radiation." He described the fibers as originating within the inferior part of the external geniculate body and the principal nucleus of the pulvinar and terminating within the visual sphere of the occipital lobe. In their course, they cross fibers originating from the superior part of the external geniculate body which enter into the stratum zonale. They are joined by fibers coursing from the internal geniculate body to the temporal lobe, hippocampus and the olfactory area. The "secondary optic radiation," or the optic radiation proper of Gratiolet, was described by him as originating within the occipital lobe and coursing to the pulvinar of the thalamus. The fibers of the primary optic radiation receive their myelin sheaths very early and before those of the secondary radiation. Flechsig believes that the primary fibers carry the impulses from the macula lutea to the visual area. Their clinical importance is therefore obvious.

Niessl-Mayendorf[7] (1903) continued Flechsig's work and more accurately described the fasciculus longitudinalis inferior, which he maintained was identical with Flechsig's "primary optic radiation." He also stated that the cells of origin were situated anteriorly. This hypothesis was supported by the appearance of degeneration and atrophy found in the fibers of this tract following lesions of the external geniculate body. Mayendorf believes that the inferior longitudinal bundle consists, therefore, of projection fibers arising within the external geniculate body and the thalamus and terminating in the calcarine fissure of the occipital lobe. He refers to the "secondary optic radiation" of Flechsig, which lies more medially, as the optic radiation proper. These fibers he described as centripetal in direction, arising in the visual sphere and terminating within the thalamus and medial surface of the anterior corpora quadrigemina.

Edinger[8] (1904) believes that the bundle in question is a long association tract uniting the temporal and occipital lobes. His conclusions were drawn from a case of ablation of the temporal cortex and from examination of the course of degenerated fibers.

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6. Flechsig: Weitere Mittheilungen über den Stabkranz des Menschlichsen Grosshirns, Neurol. Centralbl. **15**:2, 1896.

7. Niessl-Mayendorf: Vom Fasciculus longitudinalis inferior, Arch. f. Psychiat. **37**:537, 1903.

8. Edinger: Bau der nervosen centrale Organe, Arch. f. klin. Med. **73**:243, 1904.

Probst [9] (1902) has made a thorough study of the visual fibers and their connections. In his latest publications dealing with this subject, he reports a case which he studied, showing a lesion of the optic thalamus. He observed a partial degeneration of the inferior longitudinal fasciculus which extended into the temporal and occipital lobes. In the midst of these degenerated fibers, he found undegenerated fibers originating from the pulvinar and external geniculate body. The latter areas were not involved in the lesion. He also found undegenerated fibers originating within the cortex of the temporal and occipital convolutions which coursed to the cerebral peduncle. For Probst, therefore, the inferior longitudinal fasciculus consists of thalamocortical fibers directed toward the temporal and occipital lobes, and also of fibers originating within these lobes and passing to the cerebral peduncle. Under the optic radiation of Gratiolet, he includes the corticifugal fibers to the pulvinar and the anterior quadrigeminal body.

Redlich [10] (1905) describes the fasciculus longitudinalis inferior as a part of the optic radiation terminating within the calcarine fissure, the occipital pole, the inferior convolution of the occipital lobe and partly within the cortex of the parieto-occipital convexity. Within the temporal lobe, the bundle gives off fibers constituting the internal sagittal stratum. The dorsal portion of the fibers are in close relation with the thalamic radiation proper and from a part of the corona radiata. They enter the relation with the optic thalamus and with the external geniculate body, but Redlich believes that they are corticifugal fibers.

Archambault [11] (1905, 1906, 1909) has studied the inferior longitudinal bundle most thoroughly. His material was obtained from cases of cerebral softening, and his conclusions are drawn from serial sections of these brains. This author believes that the inferior longitudinal fasciculus consists of: (1) a bundle of projection fibers, which he has termed the "fasciculus geniculocalcarinus" or the "fasciculus opticus centralis" and (2) of some unnamed fibers of association. He describes the fasciculus geniculocalcarinus as a definite bundle of fibers which

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9. Probst: Ueber den Verlauf der centrale Sehfasern (Rinden-Sehhügelfasern) und deren Endigung um Zwischen und Mittelhirne und über die Associations und commissurenfasern der Sehsphäre, Arch. f. Psychiat. **35**:22, 1902.

10 Redlich: Zur vergleichenden Anatomie der Associationsysteme des Gehirns der Saügethiere, Fasciculus longitudinalis inferior, Arb. a.d. Neurol. Inst. (Obersteiner) **12**: 1905.

11. Archambault, L.: Le faisceau longitudinal inférieur et le faisceau optique central, Rev. neurol. **13**:1053, 1905; Le faisceau longitudinal inférieur et le faisceau optique central, Nou. iconog. de la Salpêtrière **2**:215, 1906; The Inferior Longitudinal Bundle and the Geniculocalcarine Fasciculus: Contribution to the Anatomy of the Tract Systems of the Cerebral Hemispheres, Albany M. Ann. **30**:118, 1909.

occupies a portion of the external and internal sagittal beds in the temporal lobe, and which constitutes the entirety of the external sagittal stratum in the occipital lobe. This fasciculus, which represents the corticipetal corona radiata to the occipital lobe, originates within the external geniculate body and terminates within the two lips of the calcarine fissure, but especially within the inferior lip. His description of the fasciculus is as follows:

> The fasciculus geniculocalcarinus takes its origin within the superior and external part of the external geniculate body. The fibers arising from the anterior part of the nucleus pass obliquely backward and inferiorly, along the external wall of the anterior extremity of the sphenoidal horn where they are joined with the fibers of the fasciculus uncinatus, the fibers of the anterior commissure and the short fibers of association of that region. They then bend slightly inward and run backward to the external part of the wall of the inferior horn of the lateral ventricle. The fibers which take their origin in the middle part of the geniculate body, enter into the constitution of the inferior part of the posterior segment of the internal capsule. Traversing the third segment of the lenticular nucleus, they turn at the level of the posterior and inferior part of the external capsule and are directed obliquely inferiorly and medially, where a part of them pass to the external sagittal couch and a part to the internal sagittal couch. Other of the fibers intermingle at this level with the fibers of Türck and with the corticipetal and corticifugal fibers of the first temporal convolution. The fibers which arise in the posterior part of the geniculate body curve around the triangular area of Wernicke and reach the retrolenticular segment of the internal capsule. They project interiorly and reunite in a compact fasciculus which embraces the inferior part and the external border of the sphenoidal caudate nucleus. The fibers are extremely dissociated by the thalamic radiation of the occipital, parietal and temporal regions, which at this level pass into the pulvinar of the optic tract.

Meyer [12] (1907) reports data derived from cases of cerebral softening, adding to Flechsig's original idea that the external sagittal layer consists of projection fibers coursing from the thalamus to the calcarine cortex. Meyer accepts Archambault's term, "fasciculus geniculocalcarinus" as designating the occipital portion of the external sagittal layer.

Curran [13] (1909) describes a well marked bundle of fibers extending from the frontal to the occipital lobe. He has termed these fibers the "fasciculus occipitofrontalis inferior." It begins as a fan-shaped structure in the occipital lobe and becomes a well defined bundle, swinging to the lower, external side of the lenticular nucleus and the external capsule. It again spreads out fanlike in the frontal lobe. Inferiorly to this bundle lies the middle and posterior portions of the fasciculus

12. Meyer: Two Cases of Cerebral Softening, Tr. A. Am. Phys. **2**:2, 1907.
13. Curran: A New Association Fiber Tract in the Cerebrum, J. Comp. Neur. and Psych. **19**:645, 1909.

uncinatus. Anteriorly, the floor of the fasciculus occipitofrontalis inferior is formed by the corona radiata and the anterior commissural fibers. In the medial portion of its extent, the floor is formed by the descending horn of the lateral ventricle, the corona radiata, the tapetum and the tail of the caudate nucleus. Posteriorly, the fasciculus lies on the ependyma of the posterior horn of the lateral ventricle. Curran believes the inferior longitudinal bundle lies more externally and inferiorly, and that some of the fibers intercross far back in the occipital lobe with the fasciculus occipitofrontalis inferior. No illustrations of the inferior longitudinal bundle are given. This author's work was done on gross dissections of the cerebral hemisphere from the lateral aspect.

Trolard [14] (1906), however, had previously made a similar gross dissection from the lateral aspect of the brain. His illustration shows in detail the fasciculus described by Curran. Trolard believes that the inferior longitudinal fasciculus, as described by Déjerine, formed a part of this bundle. The article, it seems, was only preparatory to further work; but a very careful search of the literature has not revealed the later studies.

A review of the literature, therefore, reveals opinion to be divided about equally as to whether or not the inferior longitudinal fasciculus is an association or a projection tract. Burdach, Sachs, Déjerine, Edinger, Curran and Trolard believe the bundle to be purely an association tract. On the other hand, Flechsig, Probst, Niessl-Mayerdorf, Dedlich and Archambault insist strongly that it is a bundle of projection fibers. With the exception of Curran and Trolard, whose articles include illustrations of gross dissection, the more recent authors have used degenerated material and have based their conclusions on serial sections. Curran emphasizes the fact that well defined fiber tracts in the cerebrum can be clearly defined in gross dissections of well hardened specimens.

TECHNIC

In this work, we have made several gross dissections of human brains in an effort to attain our objectives. The results of our dissections in each case have been identical. The final dissections, from which the accompanying illustrations were made, are, therefore, entirely representative. These dissections were made on adult brains, which were removed from one to four hours following death. The fresh specimens were immediately suspended in a large jar containing 10 per cent. formaldehyd solution, by attaching a cord to the vessels comprising the circle of Willis. The fluid completely surrounded the brain, and no part of it was allowed to touch any part of the container. This point of

14. Trolard: Le faisceau longitudinal inférieur du cerveau, Rev. neurol. **14**:440, 1906.

technic was insisted on to prevent distortion of the brain and to preserve the exact relations of all fibers within the cerebrum. The specimens were allowed to remain suspended in this manner for five weeks. The fluid was changed twice during this period.

Dissections of the fiber tracts were made in accordance with the detailed technic described by Curran. After the dissections were made, photographs were taken of the brain and the drawings were made from the picture and the specimen. The object of this procedure was to get the exact structural proportions and relations which are difficult to obtain from a drawing made directly from the specimen.

In our dissections, it clearly became our first duty to identify those fibers which have been included in previous descriptions of the inferior longitudinal fasciculus. By a careful evaluation of the literature heretofore reviewed, one will see that three descriptions of this fasciculus have been given.

First, Archambault's description, in which he gives in detail the relations of the fasciculus geniculocalcarinus. This, he believes to be the principal portion of what has been considered the inferior longitudinal bundle by many authors. This tract agrees with Flechsig's primary optic radiation and with Niessl-Mayendorf's description of the inferior longitudinal fasciculus.

Second, a long association tract of fibers coursing between the occipital and temporal lobes described by Déjerine, Sachs and their followers. I shall show later that at least the majority of these fibers extend anteriorly into the frontal lobe and do not end within the temporal lobe.

Third, Curran's description of the fasciculus occipitofrontalis interior, earlier seen by Trolard and apparently also by Burdach, in which he states that the inferior longitudinal fibers are placed more inferiorly than the main bundle and consist of shorter occipitotemporal association fibers.

DESCRIPTION OF SPECIMENS

Figure 1 is a drawing made from the medial aspect of the left cerebral hemisphere. The splenium of the corpus callosum, the fimbria, the inferior and posterior horns of the lateral ventricle, the cingulum and the hippocampus have been removed, as well as the overlying cortex in this region. The stria terminalis, the temporothalamic fasciculus of Arnold, and the arcuate thalamotemporal fasciculus described by Ranson have also been removed. We can very easily identify the thalamus, pulvinar, lateral geniculate body, cerebral peduncle, the optic nerve and the anterior commissure.

In the occipital lobe, the thalamic radiation to the visual area is clearly seen, extending from the cortex to the thalamus in its posterior

and superior surface. These fibers constitute the optic radiation proper, as described by Gratiolet, and have been determined to be corticifugal in direction. As we pass inferiorly and externally, we encounter a definite layer of fibers in the same plane as these fibers. This bundle runs from the lateral lip of the inferior and posterior surfaces of the thalamus and from the lateral geniculate body to the visual area. These fibers, very characteristically, curve forward and inferiorly before they sweep back to their termination. We may definitely identify them as the fasciculus geniculocalcarinus, whose cells of origin according to Archambault, rest within the external geniculate body.

Farther inferiorly and somewhat externally, we see long uninterrupted fibers lying on the same plane as the two previously described

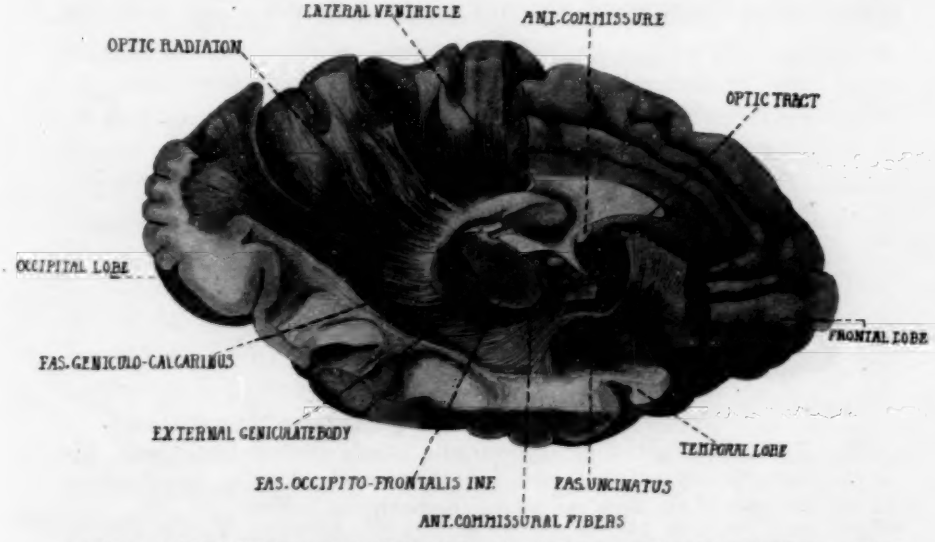

Fig. 1.—Medial view of a dissection of a human cerebral hemisphere. The splenium of the corpus callosum, the fimbria, the inferior and posterior horns of the lateral ventricle, the cingulum, the hippocampus and the overlying cortex have been removed. Reduced one-fourth.

fiber tracts. This group of fibers is in close relation above with the fasciculus geniculocalcarinus as far forward as the anterior surfacec of the lateral geniculate body. At this point, they continue still farther anteriorly to pass beneath the anterior commissural fibers. No fibers can be discerned to pass into the thalamus at this point. They spread out in a fan-shaped manner deep within the cortex of the frontal lobe. As these fibers course into the frontal lobe, they lie somewhat superior and anterior to the fasciculus uncinatus.

Still more inferiorly, we encounter shorter fibers wholly within the temporal lobe. These are shown very distinctly in the illustration and

must be considered only as longer arcuate fibers of association within the temporal lobe. The latter fibers are evidently the ones which Curran has referred to as being external and superficial to the longer fibers of his fasciculus occipitofrontalis inferior and which he groups under the inferior longitudinal bundle. Their evident intratemporal course, however, shows that they cannot properly be so designated.

The longer fibers just described as coursing between the occipital and frontal lobes and as bearing such close relation to the fasciculus geniculocalcarinus are no doubt the association tract which Déjerine, Edinger, Sachs and others have described as the inferior longitudinal bundle. We believe, however, that these fibers are merely the internal layer of the fasciculus occipitofrontalis inferior as described by Curran. By carefully dissecting away individual fibers of this layer, one invariably reaches the external fibers of Curran's bundle. The individual

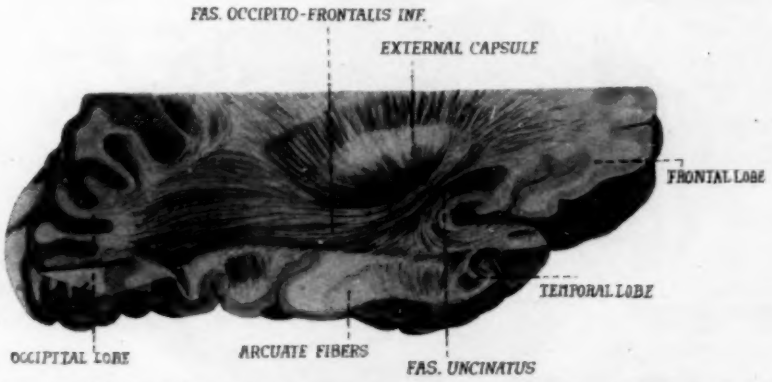

Fig. 2.—Lateral view of a dissection of a human cerebral hemisphere. The insula, opercula and adjacent parts have been removed. The dorsal portion of the hemisphere has been cut away. Reduced one-fourth.

fibers can be carried in an uninterrupted manner between the frontal and occipital lobes.

Figure 2 is the reproduction of a drawing made from a dissection of the lateral aspect of the cerebral hemisphere. The opercula, insula, superior longitudinal bundle and the fasciculus transversus occipitalis have been removed.

We see the fasciculus occipitofrontalis inferior extending between the frontal and occipital lobes. Fibers converge from a large part of the frontal lobe and swing inferiorly to the lenticular nucleus as a compact bundle. They then spread out in a fan-shaped männer into the occipital lobe. At the posterior inferior edge of the lenticular nucleus, which we see covered by the external capsular fibers, a marked depression is evident. This depression is formed by two prominences; one, situated above the depression and curving from above downward and

backward, and the other, situated below the depression and proceeding anteriorly into the temporal lobe. Still a third prominence is related to the above two and extends into the occipital lobe. These eminences are formed by the lateral ventricle with its posterior and inferior horns. Internally, the optic radiation proper and the fasciculus geniculocalcarinus occupy the concave surfaces of the superior and posterior prominences; while the inferior portion of the fasciculus geniculocalcarinus and the internal layer of the fasciculus occipitofrontalis inferior are closely applied to the inferior prominence and to the inferior portion of the posterior prominence. Externally, the fasciculus occipitofrontalis inferior sweeps over the posterior and inferior and over the inferior portion of the superior prominences.

The individual fibers of the fasciculus occipitofrontalis inferior can easily be carried forward from the occipital lobe to the frontal lobe in unbroken fashion, thus demonstrating their continuity. In its medial portion, the fasciculus uncinatus lies inferiorly and in close apposition. By carefully dissecting the fasciculus occipitofrontalis inferior away, we find, as we go deeper, that we are removing fibers which are closely related to the fasciculus geniculocalcarinus and which are shown in Figure 1 as long occcipitofrontal fibers. It seems reasonable to believe that these fibers and the fibers of the fasciculus occipitofrontalis inferior are constituents of the same bundle.

Inferior to the fibers of the fasciculus occipitofrontalis inferior, within the temporal lobe, only short arcuate intratemporal fibers are found. No occipitotemporal fibers can be found lying inferiorly, such as Curran designates under the name fasciculus longitudinalis inferior.

Throughout the literature, one encounters the terms, "internal sagittal stratum" and "external sagittal stratum." The word "stratum" is used synonomously with "bundle" or "fasciculus" by many authors. Sachs, who introduced the terms, refers to the inferior longitudinal bundle as the "external sagittal stratum." The use of these loose terms has caused misinterpretations and false conclusions which are obvious. I believe the term "stratum" should define a bed or groundwork of fibers wholly distinct from a compact aggregation of nerve fibers which form a fasciculus or bundle. I believe the external sagittal stratum consists of several components which are from the occipital lobe forward; the fasciculus geniculocalcarinus, the fasciculus occipitofrontalis inferior; the corona radiata to the parietal lobe, some fibers of the geniculocalcarine fasciculus in the temporal lobe plus the corticifugal fibers of projection of the first and second temporal convolutions, and most anteriorly, the fasciculus occipitofrontalis inferior. The internal sagittal stratum, from the occipital lobe anteriorly, consists of the optic radiation proper, some fibers of the fasciculus geniculocalcarinus and

the fasciculus of Türck. The various constituents of these arbitrary terms can easily be identified in the accompanying illustrations. It also becomes evident that the internal sagittal stratum of the occipital lobe is represented wholly by the optic radiation proper, while the external sagittal stratum in the same lobe is formed entirely by the fasciculus geniculocalcarinus.

It is clearly seen how much confusion exists as to the exact anatomy of the inferior longitudinal fasciculus. At least three distinct anatomic entities have been described under the name of this tract. The fasciculus geniculocalcarinus or the primary optic radiation of Flechsig has been definitely isolated both in degeneration sections and by our gross dissections. It is a thalamocortical projection tract, which anatomically is very hard to differentiate from the optic radiation proper. By serial sections, showing degeneration of the fibers, this becomes relatively easy. We can see no real reason for designating this tract the inferior longitudinal bundle. On the other hand, it seems logical to retain such a definite and accurately descriptive term as Archambault has applied to it.

Our dissections further show that the long fibers lying external and inferior to the fasciculus geniculocalcarinus extend between the occipital and frontal lobes. These fibers belong to the tract described from the lateral aspect by Curran, as the fasciculus occipitofrontalis inferior. The classical description of the inferior longitudinal bundle, accepted and pictured by numerous anatomic textbooks, is that of a tract extending from the occipital to the temporal poles. But the fibers in question can be definitely shown to continue in unbroken fashion from the occipital to the frontal lobes, whether examined from the medial or the lateral aspect. It has also been shown, from both aspects of the cerebrum, that no long association fibers lie inferior to this bundle either in the occipital or the temporal lobes. It seems, consequently, that those fibers are not to be named as the inferior longitudinal bundle, provided the classical description of the latter is retained. In fact, no bundle of fibers can be found by dissection, which fits the description accepted by textbook authors. This, of course, does not exclude the possibility that some fibers which join the temporal and occipital cortex may be mingled with the two long tracts just described, but these, if present, are not sufficiently numerous to make possible their recognition by the dissection method.

If we are to use accurate, descriptive, anatomic terms, we must either speak of Curran's fasciculus occipitofrontalis inferior as the inferior longitudinal bundle or we must drop the latter term, as it refers to no anatomic entity. I believe that the more definite name, fasciculus occipitofrontalis inferior, should be used to designate this

bundle, which evidently must, therefore, be purely an association tract. This is substantiated by the definiteness with which these fibers are separated from those of the fasciculus geniculocalcarinus which arise from the external geniculate body.

CONCLUSIONS

I believe, therefore, that:

1. Such purely occipitotemporal fibers of association as may exist do not form any compact bundle which can properly be termed the inferior longitudinal fasciculus.

2. There exists a long fronto-occipital tract of association, which medially, represents the fibers spoken of by Déjerine and others, as the inferior longitudinal bundle and which, externally, represents the fasciculus occipitofrontalis inferior of Curran.

3. That the term "inferior longitudinal fasciculus" should be dropped and the term "fasciculus occipitofrontalis inferior" should be used to describe this long association tract.

4. The fasciculus geniculocalcarinus of Archambault is a definite thalamocortical projection tract not to be confused with the fasciculus occipitofrontalis inferior.

I wish to express my sincere thanks to Dr. Allen B. Kanavel and to Dr. S. W. Ranson, whose kindness and help have made the publication of this article possible.

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ABNORMAL MENTAL STATES ENCOUNTERED IN A DETENTION PRISON *

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In New York, when a person has been apprehended, or has given himself up, after the commission of a crime, he is lodged in a cell in a police station, for a period of time varying from a half hour to two days. From there he is taken before a police magistrate for a preliminary hearing. If prior to, or during, his arraignment in the magistrate's court, the person shows gross evidence of mental disease or grave physical injury, he is sent to a city hospital (prison ward), where he may be detained for examination, observation and treatment. Otherwise he is committed to the city prison to be held for a further hearing, for the grand jury, for sentence or for trial. Each borough has at least one such prison, known as the detention prison. Here the accused may stay from ten minutes to a year or more (18 months), depending on various circumstances, such as the nature of the offense charged, whether bailable or not, and if bailable, whether bail can be obtained or not. Suspicious persons are detained for investigation as to their reputation, previous criminal record, or to give the police department opportunity to obtain further evidence against them. In cases of felonious assault, abortions, etc., the accused may have to stay for months to await the final outcome of the injuries inflicted on the victims. Persons convicted of less serious offenses are sometimes sentenced to a detention prison for terms varying from a day to a year.

The population of one of these institutions is, therefore, made up of sentenced persons, of those convicted but not sentenced, and of those accused but not convicted. No one under 16 years of age can be committed to a detention prison. In the Brooklyn City Prison, where I have been the medical officer for the last fourteen years, we have annually a transient population of from 15,000 to 20,000, the daily census being about 320 males and 40 females. The ages of the inmates vary from 16 to 85 years, with the greatest number between 20 and 30 years. All races, creeds, colors and nationalities, as well as every occupation and profession, are represented.

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* Read before the New York Academy of Medicine, Section on Neurology and Psychiatry, Jan. 20, 1920.

The offenses include every crime against the state, nature, person and property; they include *mala in se* (crimes involving moral turpitude) as well as *mala prohibita* (misdemeanors), violations of corporation ordinances such as the disobedience of the "8 foot" motor vehicle law, or peddling without license, and also violation of federal laws. This, roughly speaking, is the nature of the clinical material with which the prison physician has to deal.

On entering one of these institutions, an observer can at once conclude that there is no such thing as a physical criminal type. According to Lombroso and his followers, an anthropologic examination alone should in most cases be sufficient to detect a criminal, and to determine the particular crime which such an individual is most likely to commit. While it is true that a physical examination of the inmates of one of these institutions will disclose that a great many of them bear stigmas of degeneration, such as sharply pointed skulls, flaring foreheads, low and narrow foreheads, deformed ears, prognathism, notched and widely separated teeth, high arched palates, hare lips, saddle-shaped noses, spinal deformities, clubbed feet, nystagmus, albinism, stammering, polydactylism, syndactilism and hypothyroidism, the number of persons presenting these defects is not greater than one would ordinarily find among the free population.

Dr. C. P. Goring, physician to the Pankhurst Prison in England, undertook a most exhaustive study of 4,000 male convicts. He compared the physical characters of different kinds of criminals with one another, and criminals as a class with the law abiding public engaged in similar occupations. He concluded that there is no physical criminal type. From his measurements, it appears that physically there is a wider divergence between the average Oxford University graduate and the average Cambridge University graduate, than between the criminal and either of them.

Some early criminologists asserted that all criminals are insane. Lombroso succinctly states that "criminality is insanity." Modern penologists oppose this view. T. Mott Osborne, in discussing this subject in a series of lectures delivered at Yale, says:

> **Most convicts so far from being naturally stupid or showing retarded mental development, are possessed of a keenness of wit that outsiders may well envy. There is, of course, no uniformity of mental attainment or ability; and a one-sided development is often plainly noticeable, some senses like that of hearing becoming abnormally acute. But the talk of any large proportion of convicts being mentally deficient is sheerest nonsense. Another cause of misunderstanding is found in the marks of stupidity, hypocrisy and falsehoods which are adopted by convicts as a means of protection, just as Nature supplied to many animals and birds certain marks and coloring for the purpose of escaping their enemies.**

The medical inspector's report in the British Blue Book (1894-1895), states that among the prison population the rate of insanity is not less than three times as great as among the *general* population of the same ages. This higher percentage he believes to be due to the sources from which the average prison population is drawn. He calls attention to the fact that there are many lunatics wandering about the country, who will not be recognized as lunatics until they commit some crime which brings them within prison walls. Glueck says, "In a prison, mental disturbances, not necessarily committable psychotic conditions, exist in a ratio of about 10 to 1, as compared with the incidence of mental disease among the free population." Of 1,000 offenders studied by Spaulding and Healy, 65 per cent. had no discoverable mental defects or aberration.

In studying problems of this kind, statistics are of little or no value. In these institutions, a man charged with homicide for killing another human being by accident is, for statistical purposes, grouped in the same category as a man charged with killing for purposes of robbery. The average person considers as a criminal one who has committed a crime involving moral turpitude. Prison records, in general, however, speak of all inmates of prisons as criminals. Prof. Mayo Smith is correct when he says, "Statistics as to crime and its incidence present the most complicated and difficult problem within the scope of science." I agree with Osborne when he says, "Prison is as full of diverse personalities as the outside world; it is populated by the weak, the gay, the talented and the ignorant. Many prisoners have unusual personalities." Taking all the facts into consideration the conclusion is inevitable that the number of mentally abnormal persons in prisons is unusually large; but whether the percentage is 3, 10 or 35 is purely a matter of speculation.

For the purposes of studying mentality as a factor in crime, the prison population may be divided roughly into four large groups: (1) the accidental criminal; (2) the occasional criminal; (3) the insane criminal, and (4) the habitual criminal.

I realize fully that this grouping is crude and lacks most of the requisites of a scientific classification. None of these groups possesses sharp boundary lines, and as the discussion advances it will be noticed that they overlap. This classification, however, will best serve the present purpose, which is that of an orderly discussion of the subject matter at hand.

I. THE ACCIDENTAL CRIMINAL

The accidental criminal shows, as a rule, no defect of intellect or character, except that emotionally he is somewhat unstable. Therefore, he is called by some the criminal by passion. He is easily excited and

under the influence of alcohol or some temporary mental stress may commit assault or even murder. In reality he is not a criminal. His previous reputation generally is good. He never commits a crime against property, and never for gain or revenge. Numerically, he plays a comparatively minor rôle in forensic psychiatry. The only problem he presents to the prison physician is that after he is committed, it becomes very difficult for him to adjust himself to his surroundings, and he frequently develops a psychosis described in the literature as a prison psychosis or Ganser's syndrome. This is characterized at first by great anxiety and later by clouding of consciousness and amnesia with "islands of memory." Kraepelin interprets the clouding of consciousness as a manifestation of repression. The prisoner is overawed by the impending danger and overcome by the humiliation attending his arrest, and the clouding of consciousness is an attempt to exclude the painful impressions and reminiscences from consciousness.

II. THE OCCASIONAL CRIMINAL

These show no gross defect of intellect, but are possessed of little will power. Their power of discrimination is also below par. On account of their great suggestibility, they yield most easily to temptation. Their instability of character is pronounced. They begin their criminal careers when quite young. They are subject to emotional outbreaks, which are temporary in nature, and it is during these outbreaks that their antisocial activities are greatest. Their reactions are excessive and out of proportion to the nature and extent of the stimulus. They commit crimes against nature, person and property. These criminals constitute approximately three fourths of the "detention" prison population. Long sentences to penal institutions develop the criminal instinct in them and make habitual criminals of many of them.

Under this heading is included also the criminal by "adventure." He begins his criminal career in early youth, having gained inspiration from reading some startling dime novels or seeing a bold "hold up" in a motion picture. Usually he begins by stealing some money or jewelry from home and starts out to seek adventure and to satisfy his curiosity. After he is stranded, he steals from strangers in order to work his way home. On his way, he is arrested for petty larceny or vagrancy and usually lodged in prison, where he comes in contact with hardened criminals. On his discharge from prison, he reestablishes their acquaintance and thus the way is paved to habitual criminality. They are all unstable, changeable and unreliable. They cannot adapt themselves to life. When not in prison, they change their residence and occupation frequently for no apparent reason. Some of them are dull, listless, lazy, shiftless, always following the line of least

resistance. When they do not steal they beg. They are the hobos, vagabonds and tramps, so frequently encountered in county jails and lockups. In the higher classes of society they are the dilettantes. Rarely committing crimes requiring violence, they are petty larceny thieves, sneak thieves, pickpockets and forgers. Many of them have dementia praecox personalities, and differ from the psychopathic type (to be noted later) in that they have no defect of intellect.

III. THE INSANE CRIMINAL

This group constitutes a small fraction of the prison population. By an insane criminal I mean a person who, as a result of a psychosis, commits a crime. This group may be separated into two subdivisions: (*a*) the committable, and (*b*) the noncommittable.

Among the committable cases are the deteriorated paranoiacs, who commit murder or arson and who justify their misdeeds on the grounds of their delusions. The manic-depressives commit murder, assault or arson during an episode of excitement, or, while depressed, they commit murder or attempt suicide, or both.

Abnormal mental states, due to acute toxic or infectious conditions (except those of alcoholics and drug addicts), are rarely encountered in detention prisons.

The most difficult problems in forensic psychiatry are presented by the periodic insane and the epileptic who commit antisocial acts during an episode of insanity or during a preparoxysmal or postparoxysmal state.

Among the noncommittable cases I include persons with paranoid states without deterioration, the querulous and the militant women. This subgroup is much more common than the one just described. At any time during incarceration any one of these cases may deteriorate and become committable.

Many prisoners with paranoid states have delusions which appear while awaiting trial, especially if they are without relatives or friends interested in them. Having been deprived of liberty and having no one to whom to open their hearts, they become subject to marked depression with delusions and auditory and visual hallucinations. These cases are similar to the induced paranoid states and prison psychosis described by Ganser, Petery and others. Some prisoners develop religious delusions and spend hours and days kneeling and praying. In other cases, the content of the delusions is sexual. The chronic delusional insane are similar, their delusions are more systematized and develop gradually. The accused believes himself to be a great composer, painter, poet or inventor; his neighbors are jealous of him and therefore are his enemies; they are about to rob him of the fruits of his labors;

they are attempting to patent his invention; this leads to a quarrel, which results in an assault, which finally leads to his arrest.

Another is a prophet. He hears the voice of God and sees angels in heaven. Some of these prisoners are hypochondriacs. They feel the brain softening and the head empty or filled with decomposing insects; the skin has turned to parchment, it is cracking, and the joints are dismembered. Like the neurasthenics they attach the greatest significance to the slightest physical disease or injury. Their ideas are being influenced and drawn out by electricity. The devil is within them, and compels them to say words and commit acts, which they know are wrong. They have no power of criticism.

The greater number of querulants are such on admission. Others, after they have been in prison for some time, laboring under great strain and suspense, begin to doubt the justice and righteousness of the whole world and thus develop into typical querulants. The exciting cause, in most cases, is some unsuccessful litigation. As a rule they are irritable and moody and cannot interpret facts correctly. They fight continuously for their alleged rights, act as their own counsel, examine opposing witnesses and sum up the case, or, if counsel is employed, continuously advise him how to conduct the case. They are very dramatic. Often they draw their own briefs, write lengthy communications to the judges, governor, and even the President. They complain bitterly of the partiality of the presiding justice, and accuse the district attorney and the police department of "framing them up." While fighting their own cases, they hope to improve the laws for general mankind. They sacrifice all their possessions to gain the slightest legal technicality. They are busybodies, continuously advising other prisoners to change lawyers and how to conduct their cases. Very troublesome prisoners they are, always findings fault with the discipline, the food and the medical officers and continuously complaining to the higher prison authorities and making numerous foolish suggestions for the improvement of prison management.

Among the women, a similar type is observed, the so-called militant woman. She insists that nobody appreciates or understands her, and asserts that every one abuses her for no cause whatever. She is fearless, very aggressive and quarrelsome. Any one who disagrees with her is her enemy. She loves power and stops at nothing to obtain it. Apparently there is no defect of intellect. Although these patients lack insight, it is very difficult early in the disease to show the presence of delusions. They are impulsive in thought and action and Southard believes that their tendencies have some relation to sadism. They are usually arrested for disorderly conduct, malicious mischief or assault. Many of the women sent to prison as common scolds are of this type.

They are obstinate, selfish and disobedient. Discipline seems not to have the slightest effect on their conduct.

The acute prison neurosis of the anxiety type, described by Yawger of Philadelphia, we see very frequently among sentenced prisoners, just prior to their parole or discharge, and among prisoners awaiting trial or the result of an appeal. It has been found by Yawger in one third of the convicts coming up for discharge. He believes that a true psychosis does not develop because the mental strain does not last sufficiently long. Our experience bears out that of Yawger, in that the neurosis occurs mostly in persons of constitutional inferiority and in prisoners who have been charged with sexual crimes. The latter, as a rule, are masturbators, and just prior to their discharge they begin to fear that by excessive masturbation in prison, they may have lost their manhood. In most cases, particularly in those who are not habitual criminals, the anxiety is due to worry as to how they will be received by their old associates and how they will be able to make a living. The subjects of this neurosis become very restless, suffer from insomnia, loss of appetite, constipation or diarrhea; their superficial and deep reflexes are exaggerated, and the pulse is very rapid. They smoke excessively, develop tremors and are talkative, irritable and anxious. Many of them have vasomotor disturbances and may lose considerable weight.

IV. THE HABITUAL CRIMINAL

This group may be subdivided into: (A) the instinctive criminal, (B) the professional or incorrigible criminal, and (C) the feebleminded criminal.

A. The Instinctive Criminal: This class is composed of those commonly called "the prison rounders." They are moral monsters, selfish, brutal, crafty and never show remorse for their misdeeds. Although very obstinate along certain lines, they never display this obstinacy towards those whom they consider their masters. They recognize no moral responsibility, but show no evidence of defect of intellect. They are the thugs, the gunmen and the gangsters who infest the slums of the city. They resort to criminality as a sole means of obtaining a livelihood, commit crimes against the state, person and property, and derive an additional income from the proceeds of prostitution into which they force their feebleminded female companions.

B. The Professional Criminal: His character and personality are not unlike those of the instinctive criminal, but he is more conceited and more resourceful. He represents the aristocracy of the criminal world. He is intelligent, skilful, ingenious, an accomplished liar and he is very treacherous. He recognizes no obligations to law, society,

parents or friends. He commits murder, burglary, robbery and larceny, engages in counterfeiting and receives stolen goods. Only "big jobs" appeal to him and he plans them with painstaking care. When he meets resistance, he does not hesitate to maim or even murder. His defect is not one of intellect but of character and morals. His bravado is beyond description or belief. In prison he is quite at home, and even there he is busy planning new crimes.

Recently I had an opportunity to study a renowned member of this group:

G. F. H., aged 27 years, an American by birth, a high school graduate, of good family, whose previous and personal history was uncorroborated, was convicted of murder in the first degree and is awaiting execution in Sing Sing prison. He killed two employees of a savings bank in Brooklyn, while engaged with a companion in a daring bank robbery in broad daylight. The robbery netted the pair $13,000, which they stole while the bank was full of depositors and every employee at his post. G. F. H. was apprehended some months afterward in the far West, where he had been arrested for having killed a pal of his after a quarrel. This bandit had been plying his nefarious vocation for ten years with absolute disregard for human life or property. He admitted killing three men and shooting six others before he committed the last crime and he confessed to having robbed thirteen banks. He appeared refined and intelligent. He never expressed the slightest regret for his cold-blooded murders. Physical, mental and neurologic examinations were negative. He had read quite extensively and was well informed.

Instinctive and professional criminals are sometimes discussed in criminologic literature under the heading "incorrigible." They have neither desire nor intention to forsake their vicious course. Reformation of habitual criminals of this type is a hopeless task.

C. The Feebleminded Criminal: He really belongs in the psychopathic group. Southard would say that most of the members of this group are suffering from some form of "psychopathosis." He insists that an attempt should always be made to place these defective delinquents among the hypophrenics, the epileptics, the schizophrenics, the psychopathic monomaniacs, etc., and he warns "not to prejudge the situation in criminology by terming all defective delinquents psychopathic personalities." He wants to "leave room for criminals that are not psychopaths" (professional criminals).

In this group are included all persons who come in contact with the law on account of defect of intellect as well as of character, the latter being the result of the former. This is the most heterogeneous group in our classification. I have no doubt that many will find fault with my inclusion in this group of such cases as are obviously psychotic, cases of hyperthyroidism and other cases of endocrine disturbance and the alcoholics and drug addicts. This criticism is just, but these cases

are included in this group for want of a better one. The psychotic cases in this group are borderline cases, and the delinquent drug addict and delinquent alcoholic are included because, in our opinion, they are such on account of defective mental make-up and personality.

In this group of defective delinquents, we include the cases of so-called constitutional inferiority—"the misfits of society." They have been defined as "individuals who are possessed of innate mental abnormality, more or less permanent, which has affected their character and mental make-up in such a manner as to have interfered with their proper development, which does not enable them to exist in the community in which they may be placed and to observe sufficiently well the moral and social laws by which we all are governed." Such a constitution need not necessarily be congenital; it may be acquired from accidents of birth, from severe trauma, infectious disease or intoxications. The acquired cases may or may not show physical evidence of disorder of the mind or disease of the nervous system. Scholtz's classification of constitutionally inferior children has been adopted in grouping the defective delinquents found in prison:

(a) The Indolent Type.—These are dull and apathetic, lacking interest and enthusiasm, are lazy and shiftless, not unlike the hebephrenic cases of dementia praecox. They tramp through the country and beg, or steal as the opportunity occurs; but usually steal only enough to satisfy hunger.

(b) The Depressed Type.—Some one has properly said, "These are never happy except when they are unhappy." They are pessimists and believe themselves "good for nothing." To get along in the world at all, they need some artificial stimulation, so they resort to drugs or alcohol or both. It is then that they become antisocial. They are most pitiable subjects when deprived of their artificial stimulation. Many of the suicides in prison occur in this class.

(c) The Maniacal Type.—They display increased psychomotor activity; they are either inattentive or attention wanders rapidly from one thing to another. They have no defect of orientation or consciousness, no delusions and they are always very busy, but, as White says, "There is no orderly consecutiveness in their acts." They are usually in prison because of disorderly conduct, malicious mischief or minor degrees of assault.

Cases of pure depression or pure mania are rarely seen in detention prisons. The mixed forms, cases of so-called circular insanity and cyclothymia and hypomania are quite common. During the stage of depression, they present no evidence of mental retardation, delusions or hallucinations and have a definite, but not always correct, insight. The depressed state may be preceded or followed by a mild form of

excitement during which the subjects appear to feel unusually well; they are very bright and unusually loquacious. When ordered to do some work, they do it better and more quickly than any one else. This type of person, when free, engages in all sorts of projects quite foreign to his natural activities. Hecker (cited by Jelliffe) relates an instance of multiple marriage engagements made in the euphoric stage and broken in the depressed stage. Many persons charged with polygamy and seen in detention prisons are cyclothymics.

Gregory describes cases with transient attacks of manic-depressive insanity, which are characterized by short attacks ranging from a few hours to several days but which are difficult to recognize unless they are accentuated by some exogenous factor, such as alcohol. These fleeting attacks when mild in type and unaccompanied by alcoholism are often mistaken for hysteria, psychic epilepsy or migraine, and when they are accompanied by alcoholism are often wrongly interpreted as mental states due to alcohol. During these attacks the patients may commit sexual crimes, assaults, suicide or homicide.

Circular or periodic insanity is of medicolegal importance because many criminal lawyers, when they have no better defense, plead that the accused committed the crime charged during a temporary psychosis and therefore cannot be held responsible.

(d) The Impulsives.—These are prototypes of the criminal by adventure. As children they have the impulse to run away from home; in later life they become vagabonds, tramps, prostitutes, kleptomaniacs, pyromaniacs, dipsomaniacs, etc. All of them exhibit a perversion of feeling which has a peculiar effect on their habits, temper and conduct in general. The impulses appear without cause and their accomplishment is followed by a feeling of relief. As children, they exhibit great cruelty toward animals, and as adults, when they commit crimes, they do so with fiendish brutality. They are found in prison charged with every crime on the statute books, particularly with those against sex. They may be capable of considerable training and are therefore always a menace to society.

(e) The Imperatives.—In the imperative, the feeling of compulsion is coupled with doubt or fear, or both. This type, therefore, is not common among criminals.

(f) The Pathologic Liar.—Healy says, "Pathologic lying is a falsification entirely disproportionate to any discernible end in view, engaged in by a person who at the time of observation cannot definitely be declared insane, feebleminded or epileptic." Pathologic liars give a history of bad heredity, poor environment and poor memories. They are emotionally unstable and have no idea of exactness or precision. Their attention can easily be attracted, but cannot be held for a rea-

sonable length of time. They are very superficial, take no precautions to prevent their lies from being detected and most of them have no motive for lying, perhaps believing in the truth of their own lies. They are high grade mental defectives and never wilfully resort to criminality. Owing to their auto-erotism, their crimes are frequently sexual.

(g) The Epileptic.—The epileptic who has not sufficiently deteriorated to be considered insane is frequently the subject of medicolegal inquiry. Many epileptics are arrested for intoxication, when, after recovering from a convulsion, they cannot give a coherent account of themselves. In some of these cases, it may be impossible to determine whether the convulsion is due to epilepsy or to alcohol, especially when the previous history is unobtainable. Epileptics are often brought into prison charged with disorderly conduct or endangering the morals of minors, when during a state of temporary confusion, after a convulsion, they perform automatic acts, such as undressing in public or exposing their genitals. In prison one often meets persons charged with crimes of violence and brutality, committed during an epileptic equivalent. This state is followed by total or partial amnesia, and may or may not be associated with or followed by typical seizures.

(h) The Perverts.—Sexual perverts are found in large numbers in all prisons. The masturbator with his typical neurasthenia and hypochondriasis is the most common. Exhibitionists and *voyeurs*—the former charged with endangering the morals, the latter with having in his possession obscene pictures—are quite common.

(i) The Prostitute.—Although not invariably feebleminded, she is almost never a normal individual. She is devoid of self respect and possessed of mental and moral inertia. Indulgence in alcohol and narcotics follows rather than precedes prostitution. (The same may be said of criminality.) About 60 per cent. of those we see have a mental age of 10 or under.

There is a type of prostitute known as the "degenerate woman of the higher classes," or as Lombroso calls them "prostitutes of society." The historic cases of Mmes. Steinheil, Tarnowska and von Schoenheck are examples of this type. These women are highly emotional, inconsistent in thought and action and markedly inclined to lying and intriguing. They are abnormally suggestible, have very poor judgment and are utterly devoid of morals and ethics. Their innocent childlike playfulness, attractiveness, fine manners and superficial culture have a fascinating influence on men high in social, financial and professional circles, who are easily ensnared by them. They are in their ways very shrewd and cunning and thus manage to keep out of prison. They

resort to various forms of blackmail, to which their victims readily submit rather than to go to law and gain unpleasant notoriety.

(j) Kleptomaniacs.—Kleptomania is classed by White among the psychasthenias, but he adds that both kleptomania and pyromania may form part of a psychosis. Kleptomania is not to be confused with the automatic stealing of the epileptic or the habitual stealing of the feeble-minded. Kleptomaniacs have impulses to steal; they do not need what they steal and can well afford to buy what they steal. Most of them are women, and often they steal objects which cannot be interpreted, even by one with a wild imagination, as sex symbols. They usually commit these crimes near, during or immediately after a menstrual period. The behavior of girls and women charged with crimes which are committed before or during the menstrual period is so peculiar and so different from others, that we are led to believe that this fact must have some etiologic significance and is more than a mere incident.

Abnormal mental states due to dysthyroidism are most commonly seen in women suffering from hyperthyroidism. They usually are committed, charged with quarreling, disorderly conduct, assault, malicious mischief and homicide. They present the clinical features of ordinary hyperthyroidism.' Owing to their irritability and quarrelsomeness, they are very difficult prisoners to manage.

(k) The Alcoholics.—Since prohibition has gone into effect, alcohol is beginning to be a negligible factor in crime. Prior to this period, the occasional drinker came in conflict with the law while acutely intoxicated. He was usually arrested because, during the second stage of drunkenness, i. e., the stage of excitation, he committed some breach of the peace.

The chronic alcoholics were of far greater medicolegal importance. Many of them were brought in with typical delirium tremens. Some of them developed the delirium from one to eight days after admission. When arrested during the delirium, the most common charges against them were, malicious mischief, assault, attempted suicide, murder or arson. Some of our chronic alcoholics seemed to have survived several attacks of delirium tremens without showing any signs of mental deterioration. Most of them, however, and this applies also to those who never had delirium tremens, were found to have progressive weakness in the intellectual and ethical spheres. Their sense of morals was on the decline. Memory and orientation were poor, and inhibition was almost nil. The power of apperception was dull and they were subject to delusions, the most characteristic being of jealousy and marital infidelity. It may be said that those having delusions of jealousy or marital infidelity are most likely to commit murder or suicide, or both, at the same time. Those whose moral sense is on the decline

commit forgery, embezzlement, larceny, or write threatening letters for purposes of extortion and commit sexual crimes.

Dipsomaniacs, during their drink periods, commit forgery, steal and write threatening letters, which, after they have ceased drinking, they do not remember at all. The subjects of this disease all gave a history of neuropathic antecedents. Kraepelin, Gaupp, Aschaffenberg and others consider dipsomania a larval form of epilepsy. It is characterized by a premonitory period of depression, retrograde amnesia and amnesia for the attack itself. True dipsomania must be differentiated from so-called periodic drinking, which may be a phase of some psychosis or an expression of some form of disordered personality, such as the mildly paranoid or jealous type or the hysterical personality. The prognosis and treatment of these cases depend on the underlying cause.

(l) Drug Addicts.—Most delinquent drug addicts are burdened with a degenerate heredity. About 90 per cent. of them are feebleminded. If not arrested for violating the law governing the use and possession of narcotic drugs, they come in conflict with the authorities during the period of forced withdrawal of the drug. It is then that they commit petty larceny or burglary, usually in the second degree, i. e., in the daytime and without force. Sexual crimes, owing to their early impotence, are not very common among them. In our earlier experience, it was rare to find a drug addict charged with a crime of violence except in recidivists who had already been in a state prison, penitentiary or reformatory, and while there, had acquired the drug habit. Recently, however, it seems that drug addicts commit crimes involving violence, but they require unusually large doses of their necessary drug prior to the actual commission of the crime. Crimes of violence among the colored addicts are comparatively rare. This is probably due to their innate cowardice.

To use morphin, opium or cocain seems now to be out of fashion. Heroin "sniffing" is the latest style. Morphinists are characterized by their pathologic secretiveness, cowardice due to lack of selfconfidence, lying and seclusion. Any of these drugs, when taken in considerable quantities over a long period, produces a distinct change of personality. The addict becomes morally dull, and although memory and orientation may be preserved, he has a tendency to confabulate. We have seen more cases of Korsakoff's syndrome in heroin and morphin fiends than in alcoholics. Many an unjust criticism of institutional management owes its origin to the lies circulated by this class of prisoner.

The number of cocain users today as compared with five or six years ago, is almost a negligible quantity. Excessive users of cocain suffer from acute hallucinatory confusion and mania, and the withdrawal period is likewise often marked by most violent mania, with

delirium, which may persist after craving for the drug has ceased. In rare instances instead of excitement, there may be depression with hallucinations, usually visual in nature.

The Chinese never use cocain or heroin and rarely morphin. They resort chiefly to "opium smoking." They do not develop psychoses as frequently, nor do they seem to suffer as much during the period of withdrawal, as the white and colored races. Dr. Ellis, who observed the same clinical variations in the prison at Singapore, believes that this is because the Chinese addicts are very destitute, and the drugs which they can afford to buy are impure and adulterated. This reason cannot apply to the Chinese observed here, because they use the same quality of narcotic that the whites do. We are inclined to believe that the difference in symptomatology is due to racial differences.

Most drug users eventually become markedly deteriorated. The degree and type of deterioration depend on the mental make-up and personality of the user, the kind of drug used, its amount and the duration of the habit.

(m) The Hysterical Type.—These persons exhibit an unstable mental equilibrium, and are easily influenced by suggestion. They are subject to phobias and obsessions, states of automatism and dream states with confusion and clouding of consciousness. It is during these abnormal states that their antisocial activities most commonly come to light. An hysterical person is likely to commit any crime, especially those involving violence, when subject to any of these states. A purely hysterical person, unless he is in addition burdened with the criminal instinct, rarely commits a crime against property. The diagnosis of hysteria is as uncertain in the prison population as in the free population. In the absence of hysterical convulsions, sensory changes, constricted visual fields, paralyses and contractures, amnesia and episodic phenomena, a positive diagnosis may be impossible. Amnesia with "gaps" of memory, which are not the same on going over the same ground, may be of some aid in the diagnosis of hysterical amnesia. The course of all mental disorders associated with hysteria is extremely variable. The unusually large number of defective personalities and characters found among criminals must always be borne in mind when one attempts to ascribe the cause of an antisocial act to hysteria.

The freudians assert that they have achieved most brilliant results in the treatment of criminals with hysterical personalities. Indeed, they assert that they have solved some of the most difficult problems in criminality quite easily and satisfactorily, at least from their point of view. By psychanalysis, they have found that owing to numerous unconquerable obstacles to the gratification of overwhelming sexual impulses the person is put to the difficult task of sublimating his wishes

and instincts or suppressing and repressing them. In the unconscious, then, the repressed incest complex, inversion and perversion of complexes, become charged with newly repressed energies, in consequence of which the person is compelled to satisfy his perverse wishes, and to do something that society and morality have forbidden, i. e., he commits a crime. Psychanalysts admit that environment, education, physiologic and economic factors share some responsibility in the evolution of the criminal, but these, they assert, are of only minor significance. From their point of view criminality is the expression of a neurosis, of an impulse to do wrong. Criminality to them is repressed sexuality or an equivalent thereof. This, in brief, is their explanation of kleptomania, pyromania, dipsomania and allied disorders. Any one who comes in daily contact with criminals, and knows what liars and phantasists they are and how easily they lend themselves to all sorts of suggestion, is inclined to be very cautious and rather skeptical in the evaluation of symptoms and in the drawing of conclusions from uncorroborated statements which one obtains from them.

The subject of simulation in criminals is a very important one to the prison physician. According to White and others, the attempt at simulation is in itself a type of reaction which is an indication of defective personality. In many instances, the clinical picture of the "alleged" or "genuine" psychosis will not be decisive, and the social as well as the legal aspect of the case has to be taken into consideration. The more intelligent the prisoner the more difficult is the problem. As a general proposition, it may be said that one who is charged with murder, rape or arson is more likely to "play insane" than one who is charged with larceny, the lesser degrees of assault or injury to property. Although intentional deception may easily be recognized, it is more difficult to exclude a genuine coexisting mental disorder. Some of the most common mistakes simulators make are: (1) exaggeration of individual symptoms, (2) absurd and entirely wrong answers to ordinary questions, (3) wrong combinations of symptoms of different psychoses such as epilepsy and manic-depressive insanity, and (4) a too sudden onset or recession of symptoms.

In mild genuine mania, as a rule, there is some connection of thought with the surroundings; in simulated mania usually there is none. Too much incoherence in a delusion should always arouse suspicion. Simulators invariably attempt to impress on the examiner that they feel "queer" in the head, that they "hear voices" and "see things." This is particularly the case if the prisoner has had some prison or asylum experience. The onset of psychic disturbance immediately after arrest, during trial or after conviction but before sentence is strongly suspicious of simulation.

The prisoner's conduct during the examination is of great aid in the diagnosis. The malingerer avoids looking the examiner in the face, and it is quite evident that he is able to follow the conversation because he soon manifests a symptom, which the examiner tells those near him is missing. The symptoms are exaggerated while the examination is in progress. The prisoners threaten to commit suicide, but never attempt it. The physical concomitants of mental disease such as changes in the circulation, digestion, vasomotor disturbances, loss of weight, changes in the reflexes, pupillary changes and insomnia, are lacking. The subjoined case is typical of the numerous cases of simulation which have come under my notice.

M. D., an Italian shoemaker, aged 31 years, totally illiterate, with good family and personal history, was committed to the Brooklyn City Prison, charged with murder. He shot and killed his mother and his sister, the latter with her baby in her arms, for the purpose of appropriating $35 which he knew his mother had saved and hidden in a cupboard. After he had been in prison several weeks, and the seriousness of the case began to dawn on him, he began to "play crazy." At first, he refused to eat and was depressed, but after twenty-four hours apparently he became hungry, ate and became maniacal. During one of the numerous examinations, he did not recognize a button, a button-hook, a knife, a match nor a watch, when these articles were shown to him. Three and 4 he said were 8; 2 minus 2 he said was 3; he could not repeat two figures; he did not know how many fingers he had, what a spoon was used for nor his name. To all questions as to the present or past, he answered, "I don't remember, I don't know." The examination was interrupted by the prisoner several times because he said he had headaches, was "all mixed up" and "blood was rushing to his head." When tested for the Romberg sign, it was found to be absent. After the examiner had assured the attendant that something was wrong because the prisoner did not sway his body, he found on retesting him that he could not stand at all, but fell in all directions, with his eyes open as well as closed, and with the feet separated. On one occasion while the prisoners were exercising in the corridor, he had a convulsion during which he was extremely careful how he fell; and the administration of 30 drops of rhubarb and soda by mouth, which he opened voluntarily after the first request, was followed by disappearance of the convulsion. In the prisoner's presence, we instructed his keeper that should he have another convulsion, he was to be put into an ice cold tub bath and later into a padded cell. He never had another convulsion, although he stayed with us about three months afterward.

There was never any doubt in our mind that this man was simulating insanity, in order to cheat the death chair. The nature of his crime, the puerile way in which he simulated insanity, and his general mental make-up, with the absence of signs of organic, mental or nervous disease led us to believe that he was a moral imbecile, and from the fact that he knew enough to sham insanity we thought we were justified in our conclusion that as the law now is, he had sufficient knowledge to know what he did, and that what he did was wrong. He was in due time tried, convicted and sentenced to die in the electric chair. The conviction and sentence were both upheld by the highest court of the state.

TROPICAL NEURASTHENIA, TROPICAL HYSTERIA AND SOME SPECIAL TROPICAL HYSTERIA-LIKE NEUROPSYCHOSES

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These clinical notes, made during my residence in the tropics, are submitted simply to supplement the standard literature available to Occidental students. The disorders noted are among the most prevalent and baffling, as well as the least understood, of all problems to be faced by the physician and pathologist in tropical work.

NEURASTHENIA

Although the great prevalence of neurasthenia is a matter of common knowledge to physicians practicing in the tropics, the literature on the subject is not extensive. King, writing from Porto Rico, states that comparatively few persons entirely escape this disease if they live in the tropics for any length of time. Methods for its prevention had to be instituted for the benefit of foreign employees during the building of the Panama Canal. Fales, who was one of the first to give tropical neurasthenia special consideration, states that it is not only prevalent in the Philippines, but is also an important factor in preventing acclimatization of white men in the tropics "and will prevent successful colonization of the Philippines by Americans." Castellani considers the disease to be extremely common all over the tropics, in Europeans as well as in natives of the educated class. Plehn recognizes its wide distribution and gives its ravages as the principal reason why Occidentals should not attempt to reside permanently in the tropics.

In fact, all writers who have given the subject serious consideration recognize tropical neurasthenia as one of the important diseases of warm countries. As a primary disease, but more particularly as a secondary state, it is extensively prevalent among people of all ages and both sexes, foreigners and educated natives, in all parts of the tropical world. As a problem in tropical pathology it has distinctive features, and it is with these features that we are particularly concerned.

Fundamentally, neurasthenia is the result of a person's inability to stand the stress of life to which he is subjected, shown by excessive fatigue and irritability. This may be due to congenital and developmental deficiencies or the symptoms may be superimposed in other diseases. Both types have a high incidence in the tropics.

Etiology.—In addition to the accepted etiologic factors, there are those peculiar to warm climates. A study of both native and foreign residents in almost any tropical colony suggests a fertile hereditary soil for neurasthenia. The circumstances which induce many foreigners to live in the tropics often are of themselves indications of some nervous unbalance, shown by the fact that the foreign population of any Oriental city contains more than the average percentage of persons of erratic or unstable nervous dispositions. Few natives are mentally constituted to withstand the normal stress of Western civilization which so many of them adopt in zones under influence of Occidental ideas.

Children and adults are affected. The most striking examples are seen in foreign school children, 8 years of age or older. In these young people physiologic development is taking place in accordance with tropical environment, and we try to train them in accordance with Western ideas. The result is languor, lassitude, headache, irritability and nervous exhaustion to a remarkable degree.

Sex seems important. All observers agree that women are greater sufferers than men, and the highest incidence is found among girls at about puberty. One explanation of the greater prevalence among women is found in the abnormal life; the increased sexual activity; more frequent childbirth or injurious activities to avoid it; the menorrhagias and dysmenorrheas so prevalent and weakening, and the greater emotional stress under which foreign women live in most of these far countries.

Race is a striking feature among the predisposing causes. In natives it is usually more prevalent among those who are trying to adopt Western methods of energy, application and efficiency and who are unprepared by breeding, training or environment to do so. This is strikingly illustrated in the Philippine Islands where twenty years of constant effort to establish Occidental methods have led to a decided increase of the disorder among the younger generation of more progressive Filipinos.

Among foreigners in the tropics, the victims of neurasthenia constitute an ever-increasing army of misfits created in the process of acclimatization or adjustment to the immutable demands of an environment for which the white race is unsuited by hereditary or acquired characteristics.

Secondary or symptomatic neurasthenia also has a higher incidence in the tropics than in temperate climates because the variety of underlying diseases is larger and in many instances more obscure. There may be mentioned the vagaries of latent parasitic infections of the alimentary canal and liver; malaria, vasomotor complexes, syphilis, fevers, obscure infections, metabolism and internal secretion disturbances,

organic nerve disease and many others. Anemia of the central nervous system, such a frequent condition in the tropics, is an important cause of symptomatic neurasthenia. Alcohol, tobacco, drug and other habits probably are more potent factors than they are in temperate climates.

The climate, actinic rays of the sun and other physical forces receive their share of blame in most medical discussions of the subject.

Symptomatology.—While the clinical picture in general is similar to that given for neurasthenia in temperate climates, certain symptoms, particularly those expressed as disturbed special senses—stand out with more prominence or are peculiar to the tropical disorder. Disturbances of sight and hearing differ from those of the disease in colder climates, chiefly in that the preliminary stage of oversensitiveness is more defined and harassing. The later stage of exhaustion is more profound, and recuperation is slower. Changes in both taste and smell are as pronounced and annoying as those of the other two senses.

Disordered menstruation, metrorrhagia and dysmenorrhea are exceedingly frequent, annoying and often serious symptoms. These conditions often precede symptoms of neurasthenia though they are not always forerunners of that disorder, but the association is close and significant.

Diagnosis.—As the diagnosis of neurasthenia usually is made only by exclusion, that part of the problem peculiar to the tropics consists in the elimination of the special conditions mentioned under etiology. Frequently this is exceedingly difficult. More unsuspected lesions are first found in the necropsy room than is the case under similar circumstances in temperate climates.

Prognosis.—The disorder is a more serious one for the foreigner in the tropics than it is for him in his home country. Several authors attribute the high rate of insanity among Occidentals more to neurasthenia than to any other cause. Less striking, but equally definite, mental deficiencies follow or develop from neurasthenia with considerable frequency. It is a factor in the difficulties encountered by foreign women in nursing their babies, contributes to the birth of moral and physical weaklings and no doubt, as claimed by several writers, to the eventual degeneracy of a white race propagated in the tropics.

Certain foreigners who are able to adapt themselves and become acclimated recover from the disease without leaving the country, but in most instances a change of climate is necessary to avoid permanent invalidism.

Prognosis for the native is similar to that for an Occidental in his own environment. There is this difference, that "back to nature" for the educated native means such a tremendous sacrifice that it will be made less frequently. The problem of neurasthenic misfits, the place

they will assume and the influence they will exert, socially, morally and economically, is inextricably bound up with the future development of tropical countries.

Preventive Measures.—For the Occidental prevention is found in less work, less food and more sleep than he is used to. The rules for the prevention of the various infections so potent in predisposing to neurasthenia are for the most part well known and not difficult to carry out. It is well for the foreigner to recognize that the natural laws have Oriental variations; that they are unalterable and must be obeyed. For the native, prevention consists in holding his ambitions and energies within his natural bounds and resting before the breaking point is reached.

Certain foreigners should avoid the tropics as a permanent residence. This list includes women, children and old persons, neurotics and those with tuberculous tendencies. Foreigners should have a change of climate with the first appearance of well marked symptoms of neurasthenia. Other treatment is unsatisfactory.

HYSTERIA

In various papers dealing with the tropics and tropical peoples in general there is some mention of hysteria, and the great prevalence of the hysterical character or temperament among such people is frequently noted, but medical literature on the subject is meager. Some writers on tropical neurasthenia include therein much that more properly is hysteria, and some medical writers on hysteria mention that the disorder finds ideal conditions and its greatest prevalence among Orientals. My studies on the subject have been made for the most part among the various nationals living in the Philippine Islands and to a less extent in other tropical and Oriental countries. Like many other cosmopolitan diseases, hysteria in the tropics has certain distinctions and problems which are sufficiently peculiar to warm countries to warrant their brief consideration.

Foreigners.—The reasons for a higher incidence among foreigners than is encountered in their home countries are largely those already mentioned for neurasthenia. Promotion is frequently rapid in colonial services and foreigners may fall heir to responsibilities, business and social, far beyond what they would have earned in their home lands and frequently beyond what they are prepared to assume with ease and dignity. Foreign women advance with their men to positions of social responsibility for which they may not be suited and which require constant effort to sustain. Add to this the environment worries of every kind, from insects to bad water, canned food, housekeeping and the climate and a hysterical temperament which might lie dormant under

ordinary stress becomes active. The clinical types and manifestations of hysteria among foreigners do not, as a rule, differ materially from those seen in other countries.

Natives.—Among the dark-skinned natives, the hysterical character or temperament is all but universal, and the disease itself is amazingly prevalent among all classes. The hysterical temperament, with its childish type of mind as the foundation on which the disease is built, is manifested in a variety of ways. The principal features of negativism and impulsiveness, emotional instability, tendency to be influenced readily, remarkable egotism, love of and tendency to create sensations, the desire to confabulate, to fabricate and to simulate, fertility in planning and promising and delay in execution—all exist as natural attributes. With neurologic elements attuned by stress to harmonize with the psychology and an environment calculated to develop the picture, we have ideal conditions for the propagation of the hysteria which already potentially exists.

Emotional instability in particular is so widespread among the Malays and several other tropical races as to be all but universal. It is seen in children and grown people of both sexes, although more strikingly among females. The ordinary types are characterized by ever changing moods. From smiles to frowns, tears or a bolo is frequent and without serious cause. Sensitiveness is extreme and the slightest reproof leads to tears, scorn or violent bursts of anger, and nearly always is followed by an unrelenting grudge. A word or a suspectetd slight may lead from gaiety to depression. Changes from happiness to misery, from the gay-colored dress to crêpe, or from life to self-inflicted death, are frequent. Emotional reactions replace reason, discipline and justice in the control of personal affairs and sometimes those of state. They are the governing force in the rearing of children and influence the making and enforcing of laws. The wife frequently controls her husband and children by them, and men sometimes use them as an asset in business or public life.

Suggestibility reaches a stage of high development, both quantitatively and qualitatively. It is this element in the hysterical character that makes peonage a normal custom, insures one more power in tribe or community rule, and must be materially modified before personal equality or representative government by suffrage will be appreciated or practiced.

The element of sensationalism in the hysterical character is one of the most interesting in tropical pathology, because it explains the love of gossip which has reached such degree of development as to be a constant wonder to a Western student. The "underground telegraph" disseminates information more rapidly than the public press. In order

to produce proper sensation and to allow each retailer to attract attention to his own importance in the matter, exaggeration follows exaggeration with great rapidity. By this method the most trifling incident becomes a great affair. By it character is destroyed and homes ruined to an extent and in a manner all but unbelievable to Occidentals. All of this is done, not with the prime idea of injury, but because of the necessity of personal exaltation.

The motor and sensory manifestations of hysteria and the clinical types, diagnosis and treatment in ordinary cases do not differ sufficiently from those of the disease in other countries to require special discussion here.

SOME SPECIAL TROPICAL HYSTERIA-LIKE NEUROPSYCHOSES

Under this heading it seems appropriate to note some of the neuropsychoses which have their origin in the hysterical character, find favorable stimulation in a tropical environment and are perpetuated by custom. Strictly speaking, these symptom groups are not so much neuropsychoses as they are aberrant expressions of disordered neuromechanism among persons of a low order of mentality. They are special forms of deviation or expressions of immaturity brought out by influences similar to those which produce hysteria among more developed persons.

They may be arbitrarily classified thus:

Mimic Groups: Latah, mali-mali, etc.

Fury Group: Amak, juramentada, dalahara, misala, head hunting, etc.

Exaltation Group: Flagellate worship, schaumanismus, certain religions, dancing ceremonies, etc.

Stoical and Depression Group: Hari-kari, etc.

Illusion and Delusion Group: Witchery, poisoning mania, various mirages, etc.

Mimetic and Impulsive Group.—This group of psychoses includes in whole or in part latah, mali-mali, bah-tschi, yaun and myriachit, Gilles de la Tourette's disease. The "jumpers," the "barkers" and the "jerks" appear to have some characteristics of this group on the one hand and of the tics on the other. Even the tics and habit spasms are in close affinity with the group, and the possibilities of combined tic and saltatory spasm in the same patient may explain some of the difficulties in harmonizing the symptomatology.

Etiologically, all these psychoses spring from the same soil of the hysterical character among people of various degrees of mental imperfection and who express themselves in various ways, from the motor reaction in spasm in the true tics to echolalia or other types of pure mimicry, as in latah and mali-mali. In some conditions such as Gilles

de la Tourette's malady, we have both the muscular spasm and the mimicry. While all the types in the mimetic group, as well as various combinations, have their homes in the tropics, the most interesting psychosis peculiar to warm climates is represented in the condition most widely known as latah or mali-mali. This is a true mimic psychosis characterized by coprolalia, echokinesis and the prompt execution of given orders. All, or any combination, of these characteristics may exist in a given patient. The geographic and ethnologic distribution of latah is large. It includes many races, the Malays being particularly susceptible. It is found, however, chiefly among Orientals, mixed breeds and rarely in Europeans residing in the tropics. It is particularly prevalent in the Malay Peninsula, Java, Siam, China and the Philippines.

Women are more frequently affected than men, and the malady usually appears in young persons and continues throughout life. Attacks are ushered in by a variety of stimuli. Usually it is necessary to focus the patient's attention suddenly by a sharp noise, quick movement, sudden touch or flash of light. When the patient's attention is secured, the particular form of mimicry may be continued at the will of the operator without any special concentration. To break the spell, it is necessary only to stop the action being imitated.

The coprolalia frequently is introduced by more or less involuntary disconnected sounds, words, exclamations or obscure expressions. It may be continued as a regular word mimicry or echolalia. The echokinesis consists of more or less perfect motion mimicry, and even the most remarkable gymnastics are carried out to the point of complete exhaustion if the stimulation is continued. The lives of mali-mali patients frequently are made miserable by persons taking advantage of their known weakness for amusement. On the other hand, one hears pathetic stories of the death or injury of infants in the charge of "amahs" who suffer from latah. Also, authentic instances are on record in which patients with latah have been started to fighting and have killed each other. Demonstration attacks of latah resemble a mesmerism seance, and the face of the patient has the blank uncertain appearance of one under hypnotic influence. Patients usually have no distinct recollection of what takes place while they are in the latah state. One sees patients with incomplete cases of latah who, when caught unawares, make the initial movements in sound or action, and then gain sufficient control to throw off the influence.

The disease apparently is incurable, but patients sometimes learn to limit the attacks by careful and studied personal control. Latah is not limited to man, and some very good examples of the latah echokinesis may be observed in domesticated monkeys. "Having the last word" of more advanced civilization has been suggested as a

deformed evolutionary remnant of the echolalia type of these mimetic psychoses.

Fury Group.—In this group are included entirely or in part amok, juramentado, dalahara, tropenkohler and misala. Clinically, there are two divisions in this group which differ in degree only. Amok, of the Malays, and juramentado, of the Moros, are very similar, if not identical, and the same may be said of dalahara of the Malays and tropenkohler of Africans.

Amok and Juramentado.—Amok is a Malay word which means a frenzied desire to murder. Juramentado is a term used by the Spaniards designating a Mohammedan Moro who, after certain religious rites, undertakes to kill whom he can until he himself is killed. The psychosis is limited to men largely of the Mohammedan faith and ethnologically largely to Malays and Moros. It is reported as occasionally seen in India and Siberia. Among the older theories of the etiology of these conditions, there may be mentioned only to be discarded, opium using, hasheesh, Mohammedan hatred of Christians, alcoholic insanity and epilepsy.

Of more important observations which are not in conflict with the fundamental idea that the condition is a psychosis in a hysterical character, there may be mentioned the conclusion of Wallace, that it is a form of suicide. It is a well-known fact that natives of the Celebes and many other Oriental countries consider suicide an honorable proceeding and a proper way to release oneself from a difficult position. They take the amok method just as a Japanese prefers hari-kari and an Occidental shoots himself. Scheube considers that an important part is played by the want of control of the passions and desires, due to the defective training and education of the Malays, who as a race are abnormally excitable, and the fact that they attach no importance to the lives of their fellow beings.

The exciting causes are various. There may be mentioned grief over imagined or real injustice, infidelity of a wife, death of a loved one, fear of disgrace and particularly accusation of cowardice. The attacks are ushered in in two ways. In one it is preceded by days of melancholic torpor in which the patient becomes morose, gives up work and avoids his fellows. In other instances, and particularly in the juramentado of the Moros, the attacks are brought on by religious rites, incantations, music, dancing and other methods of psychic stimulation. There may be a premonitory stage during which patients state that everything before their eyes becomes red or black, giddiness sets in, and the patient remembers nothing else until the attack is over. In either case, when a sufficient frenzy is reached, the afflicted person suddenly runs into a crowd of persons or through the streets and with his "kris"

or "barong" kills whomever may come in his way, regardless of sex, age, race or any other of the usual considerations of affection or fear. One of these patients will charge into a company of armed soldiers with the same recklessness as into a group of defenseless women and children. If not killed or restrained, the patient may continue his activities from a few hours to days, until they are terminated by exhaustion or suicide. After the attack, in case of failure to secure the coveted death, the patient sinks into a deep stuporous sleep from which he finally rouses in a disagreeable, taciturn frame of mind, which may last for weeks, during which time it is well to avoid the fanatic.

Dalahara, Tropenkohler and Misala.—These conditions in etiology and clinical manifestations are very similar to the fury psychoses, except that they do not go so far. The attacks reach their apex in a spirited word quarrel, and the patients do not come to blows.

Dalahara is the quarreling disease of Filipinos described by Musgrave and Sison; tropenkohler is a similar condition described by Plehn as existing among certain African tribes; while misala appears to be the same condition among Nyasalanders, described by Howard. It is probably prevalent among many Orientals. The affliction is found in both sexes. It is more prevalent among females in the Philippines and among young adult males in Nyasaland. It affects young and old, but in Manila, where it has a high incidence, it reaches its greatest perfection among the ignorant "tao" class of betel-chewing women.

A person afflicted with the complaint will start a quarrel with a relative, friend or entire stranger. She will rapidly work herself up to a perfect frenzy of speech and gesticulation, without apparent object or cause. The attack may last from a few minutes to hours or until exhaustion takes place, only to be repeated again as opportunity offers. This affliction is not the usual manifestation of anger for cause, but a psychosis found only among the most ignorant persons.

The head hunting of the Igorots and similar practices among other heathen people represent methods of warfare and are only practiced on assumed enemies. However, it is well to remember when traveling among such people that all persons not of their own tribe are likely to be classed as enemies.

Exaltation Group.—In this group are included schaumanismus, ramaneniana, the dancing mania of Ramisiary, Saint Johns and Saint Guys; the great variety of other religious, funeral, marriage and similar rites of celebration so prevalent throughout the tropical world and wherever ignorance and the hysterical temperament are found.

The object in all of these is to secure a frenzy of emotional excitement, which is attained by incantations, singing, shrieking and dancing, aided by erratic habits. In some of the varieties, a single person may be

the patient, but in most instances the functions are community affairs. Some of the "wonder fakers" take advantage of this inherent quality to propagate frauds, religious and social, particularly in the healing art. An interesting phase in producing emotional excitement is that element which produces self-injury to attain it. One of the best examples of this is seen in the flagellate worship among certain Filipinos. The physical injury (even death has resulted) from the practice of this psychosis was so great that it has been prohibited by the church as well as by law. Persons belonging in the exaltation group are deficients of a harmless variety and our principal concern should be methods of preventing a propagation of their kind.

Depressive Group.—This group may be considered the antithesis of the fury group. It includes the stoics, depressives and certain others who end by one of the forms of self-destruction. An observation of never ceasing interest to physicians practicing in the far east is the apparent ease with which many natives refuse to acknowledge pain and the nonchalance with which they will sacrifice their own lives. Contrary to general belief, stoicism is not a natural characteristic and does not properly belong in the dominant emotional nature of most Orientals. Its extensive practice must be looked on as an attainment brought about by effort just as in the case of some of the other psychoses. It does not have the high incidence among Filipinos and Malays that it does among Japanese, Chinese, Indians and certain other races.

Suicide by a great variety of methods is practiced extensively among many far eastern and tropical peoples. In some places it is an honorable procedure even to the extent of having religious and state endorsement. The Japanese meet the "Honorable Mr. Suicide" by hari kari; the Indian by poisoning; and the Egyptian by strangulation. Among few, if any, is the act thought a disgrace, and with many it is considered an honorable and desirable way out of difficulties.

Delusion and Illusion Group.—Delusion and illusion, with their attendant deceit, mysteries and intrigue, are basic factors in the characteristic Oriental atmosphere. It is distinctive of the East, and has been much written about in prose and poetry. It is the indescribable something that one feels shortly after arrival in a tropical country and which grows to influence, absorb or destroy. It takes many forms, all suited to the normal stage setting in environment and to the emotional natures of the people. Witchery, mesmerism, devils, spirits, charms, absent treatment and many other forms are widely prevalent. They are applied for all purposes, from financial and social betterment to the healing of the sick and after-care of the soul. They are the elements used by the faker to rule an emotional, superstitious, ignorant, infantile-minded people for good or bad. The success attained is an indication of the psychologic condition of the masses.

THE SPINAL FORMS OF EPIDEMIC ENCEPHALITIS *

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The two outbreaks of epidemic encephalitis which occurred during the years 1918 and 1919 and the almost endemic condition which has continued during the year 1920 have served to provide us with material which has enriched our knowledge of the physiology and pathology of the central nervous system. Within the annals of medical history, we look in vain for records which can vie with the pages which have been written on neurologic symptomatology and pathology during the last three years. No system has been spared the ravages of this disease, and true to form, each system has stamped its signature on some one or other form of this most varied syndrome.

Prior to our more intimate and extensive knowledge of this disease, we had granted with but little or no discussion the dictum that syphilis was par excellence the master mummer of medical and neurologic science. We formerly believed that syphilis was the most protean of all infections involving the central nervous system, but epidemic encephalitis can lay claim to a teleologic influence over a wider range of symptoms, syndromes and morbid pictures than syphilis or any other disease with which we are familiar.

Perhaps one of the most valuable contributions to our knowledge of the nervous system, with which epidemic encephalitis has supplied us, is the conception that many of the diseases which formerly we judged to be due to chronic degenerative changes may now be definitely placed on an acute, subacute or chronic infective basis. How important and far reaching this new conception of many old familiar pictures may prove to be is difficult to say, but it is probable that the added zest and enthusiasm supplied by this freshening interest will result in a recrudescence of study of neurologic pathology.

The infective agent of epidemic encephalitis is preeminently one whose major affinity is for the cortex of the cerebral hemispheres and the substance of the brain stem. This characteristic was responsible

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for the various names which were applied to the disease, and its more disseminate character has only disclosed itself through the study of combination and transition forms. Spinal forms were originally considered to be unusual forms of poliomyelitis associated with somnolence, and it was only after the number of cases became greatly multiplied and our attention was directed more closely to the disease that the widespread distribution of the infective agent was recognized. Many cases which proved puzzling and often not susceptible of classification have in retrospect been fitted into their proper diagnostic folder as sporadic cases of epidemic encephalitis.

The central nervous system outside the cerebral cortex and the brain stem presents a number of structures which may be the locus resistentiae minoris for the virus of the disease; the spinal meninges, the ventral and dorsal roots of the cord, the dorsal root ganglions and the spinal cord itself. All of these, or each one, may be the site of the development of the morbid process. Pure examples of infection of one or another of these structures are rare, and it is the rule to observe symptoms which are referable only to a combination invasion of these tissues. In each picture, however, will usually be found some predominating symptom which will indicate that the major part of the infection involves one or the other of these structures.

According to the figures collected by Dr. Israel S. Wechsler, out of 864 cases, forty-four were described as myoclonic, twenty-nine as radicular, neuritic or neuralgic, twenty-four as meningitic, sixteen as myelitic or spastic, five as paraplegic, two as ventral poliomyelitic and one as dorsal poliomyelitic, a total of 121 cases. It is impossible to state definitely how many of these cases are purely spinal, as that localization is considered in this paper, but at least twenty-three can be so judged, the myelitic, paraplegic and ventral poliomyelitic. How many of the myoclonic cases can be considered as spinal in origin is questionable and the number could be determined only by a close scrutiny of the individual records. As is often the case, the study of necropsy data only serves to obscure further the picture and render accurate differentiation and classification much more difficult or wellnigh impossible on account of the widespread involvement which is shown by a study of the pathologic material. Clinical data seem of relatively greater value in diagnosis than the pathologic findings. All forms seem to be combined forms, and only predominating symptoms determine the disease picture.

Although the dorsal root ganglions are to all intents and purposes but segregated parts of the gray matter of the cord and belong to the dorsal gray of the spinal cord, it will be taken for granted that the involvement of the dorsal root ganglions by the infectious agent of

epidemic encephalitis with the production of typical herpes zoster has been considered under a separate heading by the Association.

The types of epidemic encephalitis which are apparently mainly spinal in character may be divided into two groups: (1) the ventral poliomyelitic type of epidemic encephalitis, and (2) the transverse myelitic form of epidemic encephalitis.

The ventral poliomyelitic form of epidemic encephalitis may in turn be divided into two separate subgroups: (*a*) the irritative type, and (*b*) the paralytic type.

This division of the forms of the disease affecting the ventral gray matter of the spinal cord is largely symptomatic and is made in order that the manifestations of the disease may be separately considered. It is believed that the two forms merge one into the other and further that the paralytic type is often the end-result of the irritative type. It is clearly recognized that the irritative form may clear up at any time, and recovery may take place without any apparent permanent destruction of ventral horn cells and also that the paralytic form may develop full-blown without the picture being ushered in by the irritative phenomena. The second form is apparently very rare and is included with but little evidence on which to base its claim even to a precarious existence. It seems highly probable that such cases have occurred, and it is included as a type on largely theoretical grounds. As an end-result, cases of the paralytic form are being seen in increasing numbers and the majority of the irritative forms, either myoclonic or fibrillary, eventually present some lower motor neuron defect.

In considering the case reports as found in the literature, it has become increasingly clear that the point at which cortical irritation and spinal irritation should be differentiated is at times very difficult to determine. Under similar headings, cases have been reported whose manifestations pass from the coarse segment movements of a jacksonian type through all the gradations down to the fine fibrillations characteristic of ventral horn cell irritation.

The criterion for the differentiation between these various types of movement resulting from some irritative factor is the type of movement. It is clearly appreciated and understood, that movement resulting from irritation of the cortical level of the motor apparatus resembles volitional synergized movement. The cortex is motofacient, and stimulation of that part of the brain results in a definite movement in one direction or another. Such a movement partakes of a voluntary character. It is a synergized movement in which definite synergic groups participate and in which there is an integration of synergic units, evidencing the motor concept, formula and pattern and the collaboration of the cerebellum in the movement initiated by the cere-

bral cortex. These movements are the wellknown and recognized movements of jacksonian epilepsy resulting from cerebral irritation, either by neoplastic growth or inflammatory exudate. The functional tics and spasms also fall into this group. These movements have been recognized and studied for many years, and their characteristics are so well known that there is not a great deal of confusion or misunderstanding in regard to them.

It has been estimated that there are in the vicinity of 25,000 Betz cells in the precentral convolution and 250,000 ventral horn cells. Hence we conclude that each Betz cell controls a group of at least ten ventral horn cells. We also know that the Betz cells do not exist as solitary cells, but that they are arranged in groups of varying sizes. Any irritative lesion in the cortex would without much doubt be of sufficient extent to involve at least a group of such Betz cells if not several groups. The consequent result of such stimulation will be the contraction of not only a tenfold series of ventral horn cells, but also additional series dependent upon each added Betz cell affected. A still further amplification will result from the impulses which pass coincidently from the stimulated cortical area to the cerebellum by way of the fronto-ponto-cerebellar tract, thus evoking the synergizing and coordinating function of the cerebellum. This clearly removes from the cortical level of irritation the localized and limited myoclonic contractions which may be seen playing over the surface of the muscle in the myoclonic form of the disease, producing no movement in the part, but only lightning-like, darting muscular contractions.

In a much less favorable state is our knowledge and appreciation of the movements resulting from the highest subcortical motor stratum, the corpus striatum. As a result of the flood of illumination which has of late been thrown on the functions of the basal ganglions by the French, English and American investigators, we have perhaps swung somewhat too far in our inclination to attribute all the unusual and bizarre types of involuntary movements to the influence and sphere of the corpus striatum. Nevertheless, it can scarcely be doubted that many, if not all, of the choreas, athetoses, spasms and dystonias can be laid with perfect propriety at the door of the corpus striatum. These movements are so well known that it is scarcely necessary to dwell upon them. This corpus striatum level of motion may be roughly characterized as the automatic associated stratum of movement, the phylogenetically conditioned and inherited type of movement.

The cerebellum, being definitely a nonmotofacient structure and responding to stimuli from levels above and below, and being incapable of independent irritability, has no distinctive level of motion, and we can ignore it in this connection.

The lowest level of motion except for direct muscular irritability with which we are not concerned, lies in the cells of the gray matter of the spinal cord and constitutes the spinal level of movement. These movements consist in contractions, at the maximum, of limited muscle groups and, at the minimum, single muscle fasciculi. The contractions of muscle groups are resultant upon the stimulation of a connector or association neuron by means of which a single impulse coming down from above is translated and enlarged into a contraction of a small group of muscles. These contractions are such as to produce essentially the same result, i. e., flexion or extension, abduction or adduction. There is no real synergism in these groups, there being no check and dominant element, but merely the cooperation of different muscles in producing a single movement, each contribution being essentially of the same type. It is evident that such contractions fall below the levels previously examined and do not partake of any voluntary or automatic associated character. They are simply purposeless irregular contractions, at most producing a simple movement in some direction and in lesser degrees causing the contraction of a portion of a muscle or single muscle fasciculi.

The coarse movements are usually characterized by irregular twitches which are exceedingly rapid and irregular in rate, rhythm and extent. These are called myoclonic contractions or myoclonus. They are probably dependent upon the stimulation of a small group of ventral horn cells which control a part of a muscle or a single small muscle.

At times, the type of contraction observed is quite different, a slow vermicular contraction commencing at the proximal end of the muscle and running down over the muscular belly to its distal extremity. This type of contraction probably corresponds to the stimulation of a connector or association neuron supplying groups and relays of ventral horn cells which are affected in varying degrees by the infection and whose rate of response to stimulation has been slowed down from the normal rapid reaction to the connector influence. As smaller and smaller groups of ventral horn cells are affected, the portion of the muscle belly responding to the nerve cell stimulation becomes smaller and smaller; a diminishing scale of contraction down to the typical contraction of almost a single muscle fasciculus. These are the typical fibrillary contractions with which we are so familiar and which are pathognomonic of ventral gray column cell irritation. Never producing a movement of the muscle as a whole, they can be seen producing a constant, unceasing ripple of motion over the surface of the muscle mass, often repeated in the same muscle fasciculus with lightning-like rapidity and then flitting to other fasciculi.

Another feature of many of the myoclonic types of the disease is the fact that the contractions have been preceded for a few days by lancinating pains which are typically radicular in character and distribution. The interval between the appearance of the pain and the incidence of the myoclonic contractions probably indicates the interval occupied by the passage of the infective agent from the roots of the spinal cord to the deeper parenchyma of that organ itself.

The irritative form may either persist for some time and then diminish in intensity and finally clear up with greater or less degree of disability or it may pass over into the paralytic form of the disease as a result of the ventral horn cells succumbing to the continued influence of the infective agent.

The paralytic form resembles closely that seen in anterior poliomyelitis or infantile paralysis when the volume of the infection at its onset is so overwhelming that the function of the ventral horn cell is abolished at the beginning of the disease. The paralyses are typically spinal in character, either a small group of muscles, one muscle, or a portion of one muscle being affected, there being usually no indication of a simultaneous involvement of synergic groups. This type is accompanied by all the manifestations of the destruction of the final common pathway, atonia, areflexia, atrophy and the abolition of all the various types of motor activity and response.

The transverse myelitic form of the disease resembles in all particulars, the symptom picture occasionally seen in infectious processes and in compression of the cord by fracture or neoplasm. The lesion may be complete or incomplete, depending upon the extent and severity of the process shutting off the body below the site of the lesion. The type of the syndrome in the partial transverse lesion will, of course, depend upon the anatomic structures involved. One interesting feature that has been seen in a number of such cases of the disease is the presence of a xanthochromia without the complete syndrome of Froin being present.

These transverse myelitic forms have been considered by some to be accidental occurrences in the course of an epidemic encephalitis and to be usually the result of a hemorrhage from a vessel weakened by the effects of the round cell infiltration and the perivascular rarefaction, or to be the result of an anemic or hemorrhagic infarction from thrombosis of some of the spinal vessels. This view may be upheld by the occasional occurrence of xanthochromia. It will be recalled that transverse myelitis is practically unknown as a form of poliomyelitis, and since the lesions of the two diseases are so similar, this may lend some confirmation to the views heretofore expressed.

REPORT OF CASES

The case herewith reported from the service of Dr. Foster Kennedy at the Neurological Institute, New York, is an example of the irritative form of the disease with myoclonic contractions.

CASE 1.—*History.*—G. M., aged 19, born in the United States, complained of symptoms the onset of which had occurred seven weeks before, with pain and soreness in the head, which in a few days spread to all the extremities and the thorax. A few days later, retention of urine developed. There were insomnia, a transient diplopia and a tremor with twitching movements. The patient had had the usual diseases of childhood. The family history was irrelevant.

Physical Examination.—The patient was confined to bed and seemed to prefer to sit up. There was some bending forward of the head and a definite fixity of facial expression.

There was a coarse tremor of the upper and lower extremities and a transient cog-wheel phenomenon on passive flexion of the forearm. There were quick, brief, jerky movements of the toes and feet and myoclonic contractions of the dorsal muscle groups in the thigh. There were definite rhythmical twitching movements of the abdominal walls which were somewhat more appreciable to palpation than to inspection. There was some slight voluntary control of the movements.

Reflexes: Knee jerks were both sluggish; ankle jerks were very sluggish, and abdominal reflexes were absent. No pathologic reflexes were present.

Sensibility: No definite changes in sensibility were made out; but there seemed to be a slight diminution in touch and pain below the middle of the sternum.

Cranial Nerves—Ocular Movements: There was some limitation of downward movement of both eyes and a slight external rectus paresis on the right side. The pupils were dilated and sluggish to light and accommodation. The remaining cranial nerves were normal.

Spinal Fluid: Perfectly clear spinal fluid was found under moderately increased pressure. No globulin was found; Fehling's solution was reduced; the lymphocyte count was 5; the Wassermann reaction was negative, and the colloidal gold reaction, 011100000.

Blood: This examination revealed: hemoglobin, 76 per cent.; erythrocytes, 4,200,000; leukocytes, 12,750; polymorphonuclears, 65 per cent.; lymphocytes, 32 per cent.; basophils, 1 per cent.; transitionals, 1 per cent., and eosinophils, 1.

Urine: On examination the urine was found to be yellow, turbid and acid. The specific gravity was 1.018. It contained a marked trace of albumin, an excess of indican, epithelial and squamous cells.

The subjoined case is an example of the myoclonic-fibrillary type followed by the paralytic phenomena.

CASE 2.—*History.*—A. M., aged 32, born in the United States, metallurgist, complained chiefly of weakness in the left side of the abdomen and the left leg. He gave a history of typhoid six years before; quinsy, chicken-pox, measles, mumps, all in childhood; gonorrhea two years before, and exposure to syphilis. He drank five cups of tea each day, one cup of coffee each day, used a moderate amount of tobacco, but no alcohol. He slept well. His appetite was good, he used liquid petrolatum to keep the intestinal condition normal.

Urination presented no abnormalities. There was no history of accident, operation or injury. He had had no convulsions, dysphagia, dyspraxia, no visual or auditory disturbances, no headache or vomiting. He had been married nine years and his wife had never been pregnant. The present symptoms began in April, 1920, with a feeling of "pins and needles" followed by pain in the left instep, which became much worse, until he could no longer place his foot on the floor without great pain. The pain was at first localized, very sharp and stabbing in character. In a short time the pain became shooting and lancinating and spread to the right leg. It was worse in the left leg. These pains lasted for about ten days and then gradually subsided. Before they left entirely, twitching movements appeared in both calves and spread to both thighs and the abdomen. These movements have persisted up to the present time although they have decreased in severity and extent.

REFLEXES ELICITED

Deep Tendon Reflexes	Left	Right
Jaw	2	2
Pectoral	1	1
Biceps	2	2
Triceps	2	2
Radial	2	2
Ulnar	2	2
Wrist	2	2
Patellar	2	1
Achilles	0	0
Cutaneous Reflexes		
Ciliospinal	2	2
Supra-umbilical	?	2
Suprapubic	0	2
Upper lateral abdominal	?	2
Lower lateral abdominal	0	2
Cremasteric	?	?
Babinski, etc.	0	0

The patient has no recollection of the period following the onset of symptoms for he was delirious, actively hallucinating and showed some expansive tendencies. At that time, due to the physical examination, contradictory serologic reactions and the history of an exposure to syphilis, he was treated for that condition with a reported marked amelioration of the symptoms. A report from the hospital at the time of his admission states that he presented these symptoms: insomnia, restlessness, a delayed reaction to light and accommodation, and the mental state mentioned. A neurologic report emphasizes the pupillary condition, inequality of the reflexes, the myoclonic contractions, a diplopia and a possible left facial weakness with a diagnosis of epidemic encephalitis. There was considerable sensory disturbance on both sides below the waist, involving all types of sensibility. There was considerable atrophy. The patient was discharged from the hospital early in September and has improved steadily ever since.

Physical Examination.—Dec. 30, 1920, the physical examination revealed bilateral flatfoot with some eversion. He could not walk on the toes or heels. The left foot was weaker than the right. There was some steppage, the feet and legs rotated internally in walking. There were no equilibratory distur-

bances in walking. Coordination was normal in all respects. There was no adiadokokinesis or dysmetria. Skilled acts were entirely normal.

The muscles of the abdominal walls, especially the recti of both ventral and dorsal femoral regions and ventral and dorsal tibial regions, presented a marked state of involuntary activity. This muscular activity was markedly increased by stretching the muscles. The contractions could be regulated by conscious effort only to a very slight extent. The contractions were both myoclonic and fibrillary and seemed to affect equally all of the muscles mentioned. There was a continual rippling fibrillary play of contractions which were at times superseded by lightning-like shooting contractions of larger parts of the muscles affected.

The reflexes that were elicited are given in the accompanying tabulation.

Muscle strength was diminished in the abductors of the thighs of both sides; the adductor of the left thigh was affected more than the right. The left leg was most affected. The movements of the foot were more affected than those of the leg. Power in the ventral and dorsal tibial groups was very much affected, dorsal flexion being affected more than plantar flexion.

There was a definite atrophy of the left thigh and of both legs, also of the left gluteal region: thigh, left, 38.5, right, 42.5; calf, left, 27, right, 28.

The electrical reactions were very sluggish. Faradic contractility was maintained and there was no reversal of the galvanic formula. There were no abnormal associated movements. Tactile sense was reduced below the second lumbar segment and almost abolished over the first to fourth sacral segments on both sides, more marked on left than right. There was analgesia over the fourth lumbar to the fifth sacral segment on the right, and over the second lumbar to the fifth sacral segment on the left.

The temperature area was the same as for pain. Vibratory sense was normal.

Muscle-tendon sense was normal. There was some itching over the second to fifth sacral segments on both sides, and scratching had produced some trophic ulcers on the dorsum of the right foot.

The first and second cranial nerves were not tested.

Examination of the oculomotor apparatus revealed: pupils, right, 3.25 mm.; left, 3.00 mm.; round, regular and central; normal reaction to light and accommodation; no hippus; normal position; no voluntary limitations; no nystagmus; no abnormalities of iris or media. The remaining nerves were normal.

The thoracic and abdominal viscera were normal. The pulse was 84, full and regular. Blood pressure was 125 systolic and 95 diastolic.

The following case is an example of the transverse myelitic type of the disease from the service of Dr. Frederick Tilney and Dr. Hubert S. Howe, at the Presbyterian Hospital, New York.

CASE 3.—*History.*—S. F., aged 50, Jewish, whose family and previous history was irrelevant, for the last five weeks had suffered from dizziness, diplopia, headache and paralysis of the left side of the face. There had been a definite general weakness, both eyelids drooping, and for the last two weeks, the right eye had been closed and swollen. There had been some deterioration in the sight of the right eye. The patient could not raise her legs. She suffered from nocturia. The menopause had occurred fourteen years before.

Physical Examination.—There was some enlargement of the heart in both directions. A faint blow was heard over the apex. Blood pressure was 190 systolic and 108 diastolic. There were some varicosities in both legs, and some edema.

Neurologic Examination.—The attitudes were as described. There was no thoracic respiration; the right eye was closed completely, the left partially; the left side of the face was paretic, the legs were slightly abducted, externally rotated and flaccid. The patient could not walk. Coordination was normal in the right arm. There was some swaying in the left arm. The lower extremities were not tested. There were no cerebellar disturbances. Reflexes of the upper extremity were: right, 2, left, 2; lower extremity, right, 0, left, 0; abdominal reflexes, right, 0, left, 0; pathologic reflexes, right, 0, left, 0.

There were no abnormal associated movements.

The patient could not raise her head or sit up. The movements of the upper extremities were weak and slow. There was no movement of the lower extremities except slight flexion and extension of the toes.

Tone was much reduced in the lower extremities.

There was a band of anesthesia on the left chest corresponding to the second to fourth thoracic segments and a similar area over the fourth to seventh thoracic dermatomes on the right side of the thorax. There was anesthesia over the second and third sacral segments in both legs. These changes involved all types of sensation.

There was slight papillitis in each eye. The pupils were equal, regular and central. The right reacted sluggishly to light; the left was slightly more sluggish. The right eye was closed; the left was almost closed. The right eye was immobile; the left eye showed a deficient internal rectus. There was a partial left seventh. The other nerves were normal.

Lumbar puncture revealed a perfectly clear, straw-colored fluid under increased pressure, which contained 32 cells and a few erythrocytes. The globulin was ++. The Wassermann reaction was negative.

The urine was amber and contained a heavy trace of albumin and a few casts.

Blood examination revealed: hemoglobin, 75 per cent.; erythrocytes, 3,500,000; leukocytes, 8,600; polymorphonuclears, 75 per cent.; lymphocytes, 25 per cent.

As a result of lumbar puncture, the picture became that of a total transverse lesion at the upper level indicated in the physical examination, that is, at the second thoracic dermatome. The paraplegia became complete, with retention of urine and feces. The patient subsequently developed a bronchopneumonia and died. No necropsy was permitted.

CONCERNING THE CLINICAL CLASSIFICATION OF INTRACRANIAL TUMORS *

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In the course of an address (unpublished) before the American College of Surgeons,[1] on "Brain Tumor Statistics," it was pointed out by Dr. Harvey Cushing that there was great difficulty in comparing statistics from different clinics because of the great variation in classification. It is believed that a record of the method employed in a clinic where large numbers of such cases are handled will be of value. The routine series entering the Peter Bent Brigham Hospital between April 1, 1919, and Dec. 1, 1919, has been chosen, all these cases having been under my personal supervision.

There were admitted between the dates given, 118 patients supposed to be suffering from some sort of intracranial new growth involving the brain. Some of the difficulties involved in classification may be appreciated from the following history which will be, in common with all the succeeding ones, condensed to positive findings, omitting the results of all other routine examinations unless they have a bearing on the case.

CASE 1 (P.B.B.H. Surg. No. 10598).—*Endothelioma of the right occipital lobe. Preliminary subtemporal decompression. Subsequent extirpation in a two-stage operation. Recovery.*

June 7, 1919, M. W., aged 61, a tailor, recommended by Dr. Nightingale of Worcester, Mass., entered the hospital complaining of failing vision and weakness of the right leg.

Chronology of Symptoms.—For six months he had suffered with occasional frontal headaches, not severe or continuous, and progressive failure of vision; for three months dull aching pain in the right arm and leg at times. Lately there had been weakness of the right leg.

Positive Findings.—There were tortuosity of the retinal vessels with patches of exudate along their course, no measured elevation; slight asymmetry of surface temperature, the left arm being warmer than the right; slight motor weakness in the left leg.

Discharge Diagnosis.—Brain tumor and arteriosclerosis were suspected.

He was admitted for the second time on June 23, 1919.

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* From the clinic of Dr. Harvey Cushing, Peter Bent Brigham Hospital Boston.

1. New York City, Oct. 21, 1919.

Course.—Since he had been discharged the headaches and pains in the right leg and arm had entirely disappeared.

Positive Findings.—Inconstant left ankle clonus, marked dilatation of extracranial blood vessels and bilateral low-grade choked disk were present.

Clinical Diagnosis.—Possible endothelioma.

Operation.—June 27, 1919, a right subtemporal decompression was performed. The brain was tense and vascular.

Postoperative Notes.—Ankle clonus disappeared. The decompression area was tense. He was discharged July 9, 1919.

Discharge Diagnosis.—The diagnosis was tumor cerebri, unverified; possible endothelioma.[2]

The patient was admitted for the third time on Sept. 3, 1919.

Course.—He had continued free from headaches. Vision was slightly improved. For six weeks there had been a feeling of numbness and tingling in the left arm and gradual development of weakness.

Positive Findings.—The decompression area was tense and bulging. The extracranial veins were enormously dilated. There was bilateral low-grade choked disk with secondary optic atrophy. The left pupil was slightly larger than the right. There were left homonymous hemianopsia; slight emotional left facial weakness; hypesthesia over the entire left half of the body below the trigeminal area, more evident toward the distal portions of the extremities. Sense of position was impaired in the left arm and leg. The tendon reflexes were exaggerated in the left arm and leg, with ankle clonus.

Clinical Diagnosis.—The diagnosis was cerebral tumor of the right postcentral region.

Operation.—Sept. 5, 1919, an osteoplastic exposure of the posterior right hemisphere was made. Palpation of the dura disclosed a hard area in the posterior extremity of the field, suggesting underlying endothelioma. Closure was made without opening the dura because of vicious bleeding from the bone.

Second Stage Operation.—Sept. 12, 1919. The bone-flap was again reflected. An occipital lobe endothelioma was extirpated from the attached surface of the falx. Blood transfusion was performed.

Postoperative Notes.—Recovery was rapid and uneventful in spite of the fact that the patient insisted on fasting during the Jewish holidays. He was discharged Sept. 30, 1919.

Discharge Diagnosis.—The diagnosis was cerebral tumor, verified; endothelioma.

Comment.—Although at the time of his first discharge, because of the indefinite nature of his complaints and in view of his age, it was felt that arteriosclerotic changes would account for his troubles, the possibility of tumor was not overlooked, and he was told to report occasionally for observation. It will be noted that at the time of his second admission the only motor sign was on the left side, while all his symptoms had been on the right. A right subtemporal decompression was done to relieve his eyesight while more definite localizing

2. Dr. Cushing based this impression solely on the dilated vessels of the scalp. The roentgen-ray findings were negative. He felt so sure that he sent for the patient to return although the old man was well satisfied with the results of his decompression.

signs developed. His third admission resulted from a letter to his physician inquiring about his progress. A glance at the following classification will show that this patient on his various admissions was successively in each of the three main groups in which tumor cases have come to be tabulated in this clinic.

Classification of Authors' Cases

The 118 cases were divided thus:

1. Brain tumor suspects 31
   - A. Clinically nontumor 23
     Cases admitted as brain tumor which after thorough study were not so regarded.
   - B. Clinically doubtful 5
     Cases admitted as brain tumor in which the findings were doubtful but operation was performed and no evidence of tumor found.
   - C. Clinically tumor 1
     Clinically localizable tumor, but operation although exposing location disclosed no evidence of tumor.
   - D. Verified nontumor 2
     Clinically localizable tumor, but pathologic lesion determined and absence of tumor verified at necropsy.
2. Brain tumor, unverified 24
   - A. Unoperated 13
   - B. Unlocalized 5
     Decompressed to relieve pressure symptoms.
   - C. Undisclosed 6
     Explored but no lesion found.
3. Brain tumor, verified 63
   - A. At operation 57
   - B. At necropsy, unoperated 1
   - C. At operation and necropsy 1
   - D. At necropsy, unverified at operation 4

The diagnosis written on the history sheet at the time of discharge of the patient usually includes only the main group plus the presumptive or established pathologic diagnosis, but all the necessary information for placing a case in the foregoing scheme may be gathered from the front sheet of the history after discharge. For example, if the diagnosis reads "brain tumor suspect; encephalitis" and there is no record of operation or necropsy examination, the patient obviously belongs in 1 A; if the necropsy findings are recorded, the case falls in 1 D.

The patient whose history was given at the outset, on his first admission would have been placed in Group 1A as tumor suspect, clinically arteriosclerosis. On his second admission, owing to his choked disk and the tension found at operation, his case fell into 2 B or tumor unverified, though operated, because unlocalizable and therefore

decompressed. At the last admission he was shifted to Group 3 A when the tumor was verified at operation.

Many times the final classification was determined by developments during the patient's stay in the hospital. The clinical picture was often very doubtful but gave sufficient grounds for undertaking an exploratory operation. If, during the course of the operation, no evidence of tumor was disclosed, the patient was classified under 1 B; if evidence was disclosed, (excessive tension, etc.) under 2 C; if the tumor was found and verified, under 3 A. The necessity for change sometimes occurred after a patient had left the hospital, as happened with L. McN., Surg. No. 11187, reported elsewhere,[3] who was discharged as "brain tumor unverified, presumably basilar glioma" and later came to autopsy. Examination of the brain made it necessary to shift her from 2 C to 1 D. There was found a meningo-encephalitis.

I. BRAIN TUMOR SUSPECTS: THIRTY-ONE CASES, 26.27. PER CENT.

A great many patients were admitted to the clinic with a diagnosis of brain tumor who proved to have some other disease. They have all been placed in this main group, which will be examined in some detail as at once the most difficult and most interesting. A straightforward case of acoustic neuroma or pituitary adenoma, easily recognized and routinely removed, causes little excitement, but a borderline case in which one must employ all his wits and every instrument of precision at his command arouses the most intense interest.

A. Clinically Nontumor.—In this group are placed patients admitted with a diagnosis of presumptive brain tumor in whom, on examination, conditions other than tumor were found, which it was felt would explain the symptoms. No operation was therefore undertaken. They were usually referred by general practitioners, although occasionally by neurologists.

The clinic has of course, little control over the number of cases that fall into this group. When a physician writes that he has a case of brain tumor which he wishes to refer there is little possibility of determining that no tumor is present before the arrival of the patient. And often these patients have puzzling and interesting conditions. The following case of unusual interest is a good example.

CASE 2 (P.B.B.H. Surg. No. 10229).—*Intracranial arteriovenous aneurysm with tumor syndrome of the cerebello-pontile angle. Dislocation of atlas.*

3. Bailey, P.: Contribution to the Histopathology of "Pseudotumor Cerebri," Arch. Neurol. & Psychiat. **4**:401, 1920.

April 2, 1919, Francis T. N., aged 48, a miner, was admitted to the hospital, referred by Dr. A. F. Fischer of Hancock, Mich., with complaint of pain in the back of the neck, dizziness, double vision and facial paralysis.

Chronology of Symptoms.—August, 1914, a singing noise in the left ear began which continued for two years, then ceased, leaving partial deafness. November, 1916, dizziness developed. April, 1917, diplopia appeared. December, 1917, paralysis of the left half of the tongue and a sensation of numbness and thickness appeared. February, 1918, there was weakness of the left side of the face. October, 1918, there was complete paralysis of the left side of face. June, 1918, severe pain in the neck followed a misstep. January, 1919, the left ear drum was punctured; this was followed by repeated sévere hemorrhages. February, 1919, there was severe pain in the left ear followed by discharge.

Positive Findings.—These were: left pupil larger than the right; paralysis of the left external rectus; fine nystagmus on looking to the left; hypersensitivity to pain in the area of the middle division of the left trigeminus; left peripheral facial paralysis; disturbance of taste on the posterior part of the tongue; left recurrent laryngeal paralysis; Rinne's test negative in the left ear; atrophy of the left half of the tongue; slight ataxia and adiadokokinesis in the left arm; pain on flexing the head on the chest; red mass projecting into the left external meatus; shrill and continuous humming murmur over the left carotid sheath, heard best around the left ear. In the roentgenogram there was seen to be a dislocation of the atlas.

Discharge Diagnosis.—Brain tumor was suspected clinically; there were intracranial arteriovenous aneurysm and dislocation of the atlas.

Comment.—Most cases in this group are not of sufficient interest to be detailed here. They will be reported elsewhere. It might, however, be of interest to note the final diagnosis arrived at in this clinic. There were twenty-three cases, distributed as follows: Ménière's syndrome, essential epilepsy, cerebral thrombosis (with epilepsy), encephalitis (lethargic), polyneuritis (with encephalitis), cerebral hemorrhage, congenital malformation, marasmus (with optic atrophy), hysteria (simulating pituitary tumor), otosclerosis, post-traumatic psychosis, congenital nystagmus, hysteria (simulating acoustic tumor), syphilitic meningitis, otitis media, cephalalgia (neurasthenic), senile psychosis, intracranial arteriovenous aneurysm, choroiditis, psychasthenia, cerebral embolism, toxic amblyopia and multiple sclerosis. Occasionally such a patient returned, as already noted in the case of M. W., Surg. No. 10598, from whom an endothelioma was removed from the falx cerebri in the occipital region on his third admission.

B. Clinically Doubtful.—In all the cases in the preceding group it was reasonably certain that a tumor was not present, but occasionally a patient would present himself with sufficient evidence to lead to an exploration, although the diagnosis was questionable. Often in such cases a tumor was found. If, however, normal brain or definite pathology other than tumor was disclosed, the patient was placed among the suspects. The absence of tumor of course cannot always be finally

established without a necropsy examination, even though other lesions are found. An example will be given later (F. S., Med. No. 11985).

Five instances of this sort were found, and each presents features of interest.[4]

CASE 3 (P.B.B.H. Surg. No. 11271).—*Epilepsy with mental deterioration and doubtful symptoms. Exploration. Negative findings.*

Oct. 6, 1919, John W., aged 25, a farmer, recommended by Dr. E. A. Ludden of North Brookfield, Mass., was admitted to the hospital with complaint of "fainting spells."

Chronology of Symptoms.—For nine years he had had attacks of transitory loss of consciousness, often, but not always, accompanied by muscular twitchings. According to the mother, the right side was always involved more than the left and at times only the right side was involved. There were no involuntary twitchings. The attacks occurred with increasing frequency until lately practically every day brought an attack. For four months he had had hallucinations of sight. Lately he had practiced sodomy and other sexual perversions.

Positive Findings.—The temperature was markedly irregular ranging from 97 to 101 F. The tendon reflexes in the lower extremities were sluggish. The roentgenograms showed enormous dilation of the diploeic veins with pressure absorption in the frontal region. There was marked mental retardation. The patient was seen to have a typical jacksonian attack beginning in the right arm and extending to the face, while standing, without falling but with transitory unconsciousness. The perimetric examination was questionable because of lack of cooperation.

Clinical Diagnosis.—There was a possible endothelioma of the left frontal region.

Operation.—Nov. 1, 1919, an osteoplastic exposure of the left frontal lobe was made. The extracranial vessels were much dilated, and there was excessive bleeding from the large diploeic veins. The dura was tense, and at the upper anterior corner was a thickened and roughened area. Underneath no tumor was found, although the brain was congested and tense. An attempt to enter the ventricles was unsuccessful.

Postoperative Notes.—Recovery was uneventful, and the patient was discharged Dec. 18, 1919, unimproved.

Discharge Diagnosis.—Brain tumor was suspected; epilepsy of doubtful etiology.

Comment.—The history in this case was not reliable. Neither the patient nor his mother could give a connected story. Objective signs of destruction of motor cells were lacking, but the attack seen was quite definitely jacksonian. Pressure signs were absent, but the dilated extracranial vessels and enormous diploeic veins were suggestive. During the operation, the dilated veins, the bleeding diploe, the absorption of bone, the discolored dura, everything down to the actual moment of opening the dura seemed to increase the certainty of the diagnosis.

4. The publication of this article was delayed by the absence of the writer from the clinic for several months. This section is left as originally written, and the progress of the patients since discharge is indicated in the footnotes.

The nature of the lesion is uncertain, and the gradually increasing mental deterioration, the epileptic attacks gradually becoming more frequent, the circulatory changes in the skull and the irregular temperature require some explanation. A deep lying glioma may yet be found.[5]

CASE 4 (P.B.B.H. Surg. No. 11130).—*Convulsions of cerebellar type with doubtful tumor symptoms. Exploration. Negative findings.*

Sept. 9, 1919, Eloise T., aged 44, a housewife, recommended by Dr. J. W. J. Marion, of Calais, Me., was admitted to the hospital with complaint of headaches and vomiting.

Chronology of Symptoms.—For six months she had had attacks of severe suboccipital headache with vomiting, unaccompanied by nausea. The attacks were sudden in onset and short in duration. Lately they had been much more frequent. For the past week there had been slight weakness and tremor of the right hand and prickly sensations in both arms.

Positive Findings.—There were fine nystagmoid twitchings on lateral movements of the eyeballs; slight incoordination of the left hand; tendon reflexes on the left side slightly exaggerated; slight edema of the nasal borders of the optic disks.

Clinical Diagnosis.—The diagnosis was: possible cerebellar tumor.

Operation.—A bilateral suboccipital craniotomy was performed Sept. 15, 1919. There was no unusual tension, but considerable respiratory difficulty; no internal hydrocephalus. Puncture of each cerebellar hemisphere disclosed nothing abnormal.

Postoperative Notes.—During the first week there were periods when the respiratory rate reached as low as 7 per minute. The patient complained of pain in the arms at first but improved rapidly and was discharged Oct. 21, 1919, entirely free from symptoms.

Discharge Diagnosis.—Brain tumor was suspected; essential pathology undetermined.

Comment.—This patient lived in the Maine woods, far away from surgical aid, and since it was feared that a severe attack might prove fatal, in case a tumor were present, before she could be transported to a hospital, an exploratory operation was advised. If, in this case, an internal hydrocephalus had been disclosed, she would have been listed as having a case of cerebellar tumor, unverified. It may be that the

5. Note from the Monson State Hospital, Palmer, Mass., Oct. 20, 1920: "This patient died May 23, 1920, and the cause of death was given as epilepsy with status epilepticus. He was admitted to this institution Dec. 18, 1919. . . . His seizures averaged from three to twelve of the G. M. type and from none to 260 of the P. M. type. . . . I regret that no autopsy was obtained . . . ."

In this clinic a man was recently operated on, John P., Surg. No. 13161, who gave a history of mild sensory attacks over a period of sixteen years. Pressure symptoms and motor attacks had appeared only within the last six months. At operation an extensive cerebral glioma was found.

obstruction was too recent and transient to result as yet in a dilatation of the ventricles.[6]

CASE 5 (P.B.B.H. Surg. No. 11256).—*Internal hydrocephalus with postoperative cerebral hernia and cerebrospinal fluid leak. Successful closure.*

Oct. 2, 1919, Hayman C. H., aged 22, a bank teller, referred by Dr. J. W. Alsobrook, of Plant City, Fla., was admitted to the hospital with complaint of paralysis of the left arm and leg and discharge from the right side of the head.

Chronology of Symptoms.—December, 1918, he had an acute tonsillitis, followed by right otitis media. The ear drum was punctured, followed by persistent discharge. March 15, 1919, the discharge from the ear ceased. April 7, he had a headache. April 8, he had a violent headache and staggering gait. April 11, the ophthalmologist diagnosed choked disk and advised operation at once. Operation was refused. April 15, operation was performed. A transverse incision through the right temporal muscle was made. The temporal lobe was explored but no abscess was found. The wound was packed with gauze. April 17, another unsuccessful attempt was made to find the abscess. The wound was again packed and the packing was changed every day. Hernia of the brain developed. April 24, there was beginning weakness in the left arm followed soon by weakness in the left leg. May 1, the fungus sloughed entirely and the brain receded into incision. May 3, the incision had healed. May 5, the patient had severe headache. May 7, the wound was opened and kept open by drains ever since.

Positive Findings.—The findings were: a right temporal protrusion from which cerebrospinal fluid was escaping; bilateral secondary optic atrophy; fine nystagmus to right; left facial paresis; Weber's test lateralized to the right and Rinne's test negative for the right ear; deviation of the tongue to the left; paresis of the left trapezius; suboccipital tenderness on the right side; flaccid paralysis of the left arm except for some spasticity of the biceps and flaccid paresis of the left leg; exaggeration of biceps, triceps, periosteal, knee and ankle reflexes on the left side with a positive Babinski reflex and wrist and ankle clonus; hypesthesia of the left half of the body for touch, temperature and muscle sense; epigastric, abdominal and cremaster reflexes absent on the left side.

Clinical Diagnosis.—The diagnosis was possible cerebral tumor.

Operation.—Oct. 9, 1919, a right osteoplastic exploration disclosed a sinus leading down to an enormously dilated right ventricle. No other lesion was found. The defect was closed.

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6. The patient was readmitted March 8, 1920, Surg. No. 12044. Vision had progressively failed to almost total blindness. Frequent attacks of vomiting developed, with generalized convulsions and incontinence. There were no headaches. Examination showed anosmia, bilateral primary optic atrophy, fibrillary twitching of the muscles around the mouth, absent knee and ankle jerks, slight ataxia of the hands and paresis of the left internal rectus muscle. March 19, 1920, a transfrontal operation revealed no pathologic changes in the region of the pituitary. The Wassermann test of fluid withdrawn from the lateral ventricle during operation was positive. All previous tests for syphilis had been negative.

A note from the husband, Nov. 1, 1920, stated: "Has been confined to her bed since (return from hospital); appetite exceptionally good and sleeps well but is gradually wasting away."

Postoperative Notes.—The defect remained closed. The patient was discharged Nov. 1, 1919, with the neurologic condition unchanged.

Discharge Diagnosis.—Brain tumor was suspected; there was internal hydrocephalus of unknown etiology.

Comment.—The surgeon first became suspicious of tumor when the wound would not close without development of pressure symptoms. There was evidence to support such a suspicion. In the first place, no abscess was found, and the subsequent course of the disease argued against the presence of abscess. Furthermore it was early for the development of abscess. Also the surgical damage, bad as it was, could hardly have involved any portion but the temporal lobe, while progressive paralysis of the arm and leg developed.

It is stated that at the time of the first operation a cyst was opened and clear fluid escaped. It seems most probable that the surgeon made an opening into the lateral ventricle and continued to keep it open by packing until the foramen of Monro became occluded. When an attempt was made to close the exterior opening, a unilateral hydrocephalus developed, giving rise to headache, which was relieved by establishing a permanent sinus. After the sinus was finally closed here, considerable pressure developed for a day or two and disappeared, which we may perhaps explain by supposing that the foramen was again forced open, or even that an opening was forced through the septum pellucidum, as often happens in internal hydrocephalus.

Why the abscess was searched for in the temporal lobe is not certain. The staggering gait would indicate the cerebellum as the seat of trouble. If an abscess were present in the cerebellum, draining the lateral ventricle would relieve the pressure symptoms, but after such a long interval, closure of the drainage sinus would surely have led immediately to a recurrence of the symptoms, for although a brain abscess may heal spontaneously, it rerely does so.

There is even some question as to the condition of the eyegrounds prior to the first operation. The information at hand states that there was present bilateral choked disk with destruction of more than half of each retina. It seems most likely that the patient had an acute labyrinthitis, and that all his later troubles were due to operative trauma. The paralysis was probably caused by disturbance of circulation in the area of the middle cerebral artery when the hernia sloughed.[7]

7. Note from physician, Oct. 14, 1920, states: "Since his return from the hospital he has had several attacks of distention of the cyst which required drainage. He is now able to walk with a cane and move his left arm slightly. His eyesight is not improved in the least. . . . His general health is good."

CASE 6 (P.B.B.H. Surg. No. 10355).—*Chronic circumscribed arachnoiditis with cerebellar tumor syndrome. Exploration. Death.*

April 24, 1919, Joseph E., aged 33, a cigarmaker, referred from the outpatient department, was admitted with complaint of occipital headache and staggering gait.

Chronology of Symptoms.—March, 1912, the patient developed attacks of severe headache, usually suboccipital. The attacks increased in severity and were always accompanied by vomiting and dizziness. Meanwhile diplopia developed, and his eyesight began to fail. August, 1912, a right subtemporal decompression was made at the Massachusetts General Hospital which disclosed a tense brain but no other lesion. Following the operation there was rapid improvement. Headaches, vomiting, diplopia and dizziness ceased. August, 1915, the patient noticed an increasing clumsiness of the right hand so that he was obliged to discontinue work. August, 1918, attacks returned of severe suboccipital headache accompanied by stiffness of the neck and great unsteadiness of the gait. The attacks were increasing in frequency and severity.

Positive Findings.—These were: marked bilateral suboccipital tenderness and stiffness of the neck; staggering gait with greater tendency to fall to the right; diminution of muscle tone and power on right side, with incoordination, ataxia and adiadokokinesis; rotatory nystagmus downward and to the left on looking upward; secondary optic atrophy; cranial defect under right temporal muscle, not tense nor bulging; and an astereognosis of the right hand with some lowering of two-point discrimination. In short, there were definite signs of cerebellar involvement, but at the same time an unmistakable sign of involvement of the left parietal region of the cerebrum.

Clinical Diagnosis.—The case was diagnosed as a possible double meningeal endothelioma.

Operation.—The usual bilateral exposure was made May 14, 1919. The arachnoid was thickened and adherent to the dura, and in it were huge cystic spaces. The cerebellum was much deformed. The left hemisphere seemed about one-half its normal size, and the right was almost totally destroyed, only the great fiber bundles remaining. On attempting to puncture the left ventricle much fluid was secured immediately under the dura so that there was undoubtedly here also an arachnoid cyst.

Postoperative Notes.—The patient recovered consciousness completely and the condition seemed satisfactory except for profuse sweating and hyperthermia until he died suddenly of respiratory failure thirty-six hours after the operation. Necropsy examination was refused.

Discharge Diagnosis.—Brain tumor was suspected; chronic circumscribed arachnoiditis.

Comment.—The presence of tumor was doubtful, without assuming the remote possibility of a double lesion. Of course, supratentorial tumors may give rise to slight cerebellar symptoms, but in this case both the cerebellar symptoms and the astereognosis were pronounced. Fearing a bad cerebellar seizure might prove fatal, an exploratory operation was considered justified.

CASE 7 (P.B.B.H. Surg. No. 10331).—*Hysteria with cerebellar tumor syndrome. Exploration. Negative findings. Recovery.*

April 20, 1919, Charlotte R. K., aged 33, a school teacher, recommended by Dr. Joseph Stanton of Boston, Mass., was admitted to the hospital with complaint of headache, vomiting, dizziness, double vision and attacks of unconsciousness.

Chronology of Symptoms.—At 4 years of age the patient had had an otitis media following scarlet fever. In 1913, she had a ventral suspension of the uterus performed. In 1915, some friends persuaded her to have her ear operated on although, except for a slight discharge, it caused her no trouble. In July, 1915, a radical mastoid operation was performed on her left ear. There was some delay in healing requiring skin graft, but final healing occurred in December, 1915. January, 1916, she suffered from nausea, double vision and severe dizziness. The symptoms subsided in ten days, but slight dizziness continued until summer. October, 1916, she had a similar attack accompanied by unconsciousness for three days at the onset. There was residual slight dizziness. January, 1918, she had a third attack accompanied by unconsciousness. Operation was performed through the external acoustic meatus. March, 1919, she had a fourth attack accompanied by unconsciousness. The old mastoid wound opened. Since that time she had remained in bed, never free from dizziness, nausea and double vision. She had had two other attacks of unconsciousness, one late in March and another just previous to admission.

Positive Findings.—These were: slight tortuosity of the veins of the retinae with obscuration of the nasal margins of the disks; paresis of the left facial nerve, apparently peripheral in type; Weber's test lateralized to the left ear; Rinne's test negative and auditory acuity much diminished in same; muscle tone markedly diminished on left side; Romberg sign positive; gait reeling with tendency to go to the left; slight incoordination of the left upper and lower extremities.

April 23, 1919, the patient was found in a strange semisomnolent state, with deep, rapid respirations, 24 per minute with expiratory grunt. She opened her eyes but did not respond to questions. The accessory respiratory muscles were called into play. The pupils were widely dilated. The veins of the fundi were dilated and tortuous, with edema of the nasal margins of the optic disks. There was no stiffness of the neck and no suboccipital tenderness. The rectal temperature was 99.2 F.' The leukocyte count was 16,400.

Clinical Diagnosis.—This was possibly a case of extracerebellar tumor; there was probably a chronic arachnoid cyst of the left cerebellopontile angle. Consultation with Dr. Eugene Crockett, who concurred in this opinion.

Operation.—May 3, 1919, the usual suboccipital exposure was made. Although exploration of the left recess was carried down to the temporal bone and the seventh and eighth nerves were seen, no abnormality was disclosed.

Postoperative Notes.—The patient was extremely unruly during convalescence, screaming and crying almost constantly at first. She had one of her semisomnolent attacks, but was found at the same time to have secreted candy in her room, of which she consumed quantities. Suspicion growing that her troubles were mainly functional, she was given a vigorous lecture and became much more tractable. She was discharged June 7, 1919, with practically the same symptoms as on admission.

Discharge Diagnosis.—Brain tumor was suspected; hysteria.

Comment.—It was considered most probable that there was a circumscribed arachnoiditis in the angle. Acoustic tumor was possible since such cases often give a history of chronic otitis media. At least

one good result came of the operation. She was cured of having operations.

Some time after operation a friend came to visit the patient. For apparently no reason the patient called me aside and told me not to talk to the woman for she was a great liar. Of course the friend was interviewed as soon as possible. She stated that she and the patient had lived alone for some years, and although she did not consider the patient insane, she thought the patient was never normal. Many times she tied the patient in bed at night to keep her from walking away. Attacks of semiconsciousness and speechlessness had been present several years previous to the first mastoid operation. The friend could always tell when an attack was coming on by the listless way the patient sat around. The relatives denied all knowledge of such occurrences.[8]

C. Clinically, Tumor.—In a single instance the diagnosis was not doubted, clinically, but no evidence of tumor was disclosed although the region was fully exposed. It seems equally certain now that no tumor was present, but necropsy examination is necessary for verification. The case follows:

CASE 8 (P.B.B.H. Surg. No. 10727).—*Dyspituitrism with diabetes insipidus. Operation. Negative findings.*

June 27, 1919, David S., aged 14½, a schoolboy, recommended by Dr. Jacob Rosenbloom of Pittsburgh, was admitted to the hospital with complaint of poor vision and excessive thirst.

Chronology of Symptoms.—For the last ten or eleven years the patient had suffered from excessive thirst and polyuria. Sight had been failing for two years.

Positive Findings.—The findings were: bilateral primary optic atrophy; visual acuity about 10/50 in each eye with a very small area of vision in the lower part of each field. The clinoid processes were greatly thickened There were slight skeletal undergrowth and feminine distribution of hair, but the genitalia were well developed and the voice was quite masculine. Libido was undeveloped; basal metabolism, —16; average water intake per diem, 8,500 c.c.; daily urine output about the same. The body temperature was very variable, 95 to 99 F.

Clinical Diagnosis.—A diagnosis of supracellar cyst was made.

Operation.—July 14, 1919, the usual transfrontal procedure was carried out with no difficulty. The frontal lobe was easily elevated, and a good view was had of the chiasm. No evidence of any tumor was disclosed.

Postoperative Notes.—The condition remained unchanged until he was discharged July 31, 1919.

Discharge Diagnosis.—Brain tumor was suspected; diabetes insipidus.[9]

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8. Note from the patient Oct. 24, 1920, states: "Dear Sir: In reply to your request of October 4, will say . . . that I am able to work and as far as your records are concerned—condition is O.K."

9. A note from patient's sister, Oct. 8, 1920, stated: "We can notice no material improvement in his condition. His health is about the same, that is, it is very good in comparison to the condition of his eyes. He still maintains an enormous consumption of water . . . ."

Comment.—In a very similar case, except for the diabetes, a cholesteatoma of the third ventricle was found.[10]

D. Verified Nontumors.—In 1904, Nonne [11] described a series of cases which he tried to combine into a clinical entity characterized by more or less slow development of the picture of brain tumor. If death occurred, neither macroscopically nor microscopically was any adequate lesion discovered. To such a clinical picture, Nonne applied the term "pseudotumor cerebri."

Many similar cases have subsequently been reported, but always, when properly examined, definite histopathologic changes have been found and these of the most varied description. As has been pointed out elsewhere,[8] the use of the term "pseudotumor" to refer to them is unfortunate. Malaria and miliary tuberculosis may simulate typhoid fever but to designate such instances as "pseudotyphoid" would only cause confusion. It is certain from a careful examination of lesions simulating tumor of the brain that no such clinical nor pathologic entity exists as Nonne tried to establish. Furthermore, tumor of the cerebellum is simulated at least as often as tumor of the cerebrum.

It has been decided in this clinic to discard the term "pseudotumor cerebri" although it is occasionally written in parenthesis after one of the brain tumor suspects to indicate that it might be such a condition as Nonne had in mind.

The rules for recognizing pseudotumors laid down by Nonne,[12] in his last monograph on the subject, are copied from Higier as follows:

1. Evident infection, severe anemia, and physical and psychic trauma must be absent.
2. The onset must not be acute.
3. Signs of essential hydrocephalus must be absent (head deformity, etc.).
4. If recovery occurs, it must be gradual.
5. If death occurs, no pathologic changes must be found after thorough microscopic study.

There may have been cases at the time of Nonne's first publication (1904) in which no pathologic changes could be demonstrated, because the methods used were imperfect. Certainly every case examined by modern histopathologic methods, especially those for bringing out changes in the glia, has shown definite lesions.

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10. Bailey, P.: Cruveilhier's "Tumeurs Perlées," Surg. Gynec. & Obstet. **31**:390, 1920.

11. Nonne: Ueber Fälle vom Symptomencomplex von Tumor cerebri mit Ausgang in Heilung, Deutsche Zeitschr. f. Nervenheilk., **27**:169, 1904.

12. Nonne: Der Pseudotumor cerebri, Neue deutsch. Chir. **10**:107, 1914. (Die allgemeine Chirurgie der Gehirnkrankheiten, Part 2.)

In the present series were two patients who had typical history and findings of localizable tumor. Concerning one, Lizabel McN., Surg. No. 11187, recorded in detail elsewhere,[3] there will be no question. There was present a complete picture of tumor of the left cerebellar hemisphere. Histopathologic examination of the brain proved it to be a meningoencephalitis.

The history of the other case will be given and the propriety of its inclusion in this group discussed later.

CASE 9 (P.B.B.H. Surg. No. 10912).—*Solitary tubercle of left cerebellar hemisphere. Removed at operation. Tuberculous meningitis. Death.*

July 30, 1919, Stewart D., aged 27, a business man, was admitted to the hospital, recommended by Dr. Hoover of Cleveland, Ohio. He complained of headaches, vomiting and unsteady gait. The left testis and epididymis were removed in 1916 for tuberculosis.

Chronology of Symptoms.—For six months he has suffered with stiffness of the neck, for four months with dizziness and vomiting on arising; for three months with suboccipital pain, and for two weeks with a tendency to deviate to the right in walking and with unsteadiness of the right hand.

Positive Findings.—There were present: bilateral choked disk of I D.; marked nystagmus on looking to right and left and a positive Romberg sign. The gait was staggering. Slight ataxia was found in both hands, more noticeable in the left. There were also slight left facial weakness, suboccipital tenderness on both sides; the head was held tilted to right. Bradycardia was found.

Operation.—Aug. 1, 1919, under procain anesthesia a large solitary tubercle of left cerebellar hemisphere adherent to the dura was disclosed. It was removed intact by careful dissection with ample margin of brain tissue.

Postoperative Notes.—On August 17, the temperature was normal and the patient felt perfectly well. On August 23, there was afternoon temperature of 100 F., and some stiffness and soreness of neck. On September 11, the temperature was falling; on Sept. 14, the patient became irrational.

Second Operation.—A parasagittal incision was made, September 16, into the old operative defect in bone on left side revealing a tuberculous meningitis. On September 19, the temperature was normal, the patient being irrational and incontinent. On September 22, the temperature was 97 F. The patient died September 24 with temperature 105.4 F.

Necropsy.—This was performed September 25, and revealed tuberculous meningitis, a small tuberculous cavity in apex of right lung and tuberculosis of prostate.

Discharge Diagnosis.—The diagnosis was tuberculosis of the prostate and right lung, tuberculoma of left cerebellar hemisphere, postoperative tuberculous meningitis.

Comment.—The possibility of tubercle was not overlooked here, although physical and roentgen-ray examinations of the chest were entirely negative. At any rate, surgical relief was indicated, for whether tubercle or tumor it was evidently interfering seriously with cerebrospinal fluid drainage.

There is some question as to whether tuberculoma and gumma should be included under the brain tumors. There is no doubt that

both may give rise to typical tumor manifestations and even demand surgical removal. On the other hand, neither tubercle nor gumma is a neoplasm, but rather an infectious granuloma and the indications for surgical therapy are far from clear in many cases.

Although a solitary tubercle may be successfully removed, there is no way of knowing that others do not exist in the vicinity. If the surgeon cuts into one of these, infection of the meninges is almost certain. Even in the most favorable cases, such as the one just reported in which necropsy proved that only a single large tubercle was present, the result is very often utterly discouraging. Gummas may be much more safely removed, but it is rarely necessary. Certain old, hard, fibrous lesions may necessitate surgical removal, but most of them may be successfully combated by medical means.

These are border line conditions, and it is very difficult at times to know just where to draw the line. Multiple small tubercles may be present. Also, the astonishing thickening of the basilar meninges encountered at times in syphilitic basilar meningitis may simulate very closely suprasellar tumor. In order to emphasize the problems connected with these lesions, there is a tendency in this clinic to group the infectious granulomas with the tumor suspects.

II. UNVERIFIED BRAIN TUMORS: TWENTY-FOUR CASES, 20.34 PER CENT.

The unverified brain tumors fall definitely into three groups. The meaning of the term "verification" will be explained under Group III.

A. Unoperated.—Of the thirteen unoperated cases, five operations were postponed merely for the convenience of the patient; four cases were thought to be pontine gliomas for which no operative procedure is of any avail; two were metastatic carcinomas; one patient was an acromegalic whose symptoms had been quiescent for twenty years; and in one case, probably a frontal glioma, the patient refused operation. In every case both pressure and localizing symptoms were present (except the pituitary cases in which pressure symptoms were absent).

B. Unlocalized.—Five patients had definite pressure syndromes but insufficient localizing symptoms. In such cases, a right subtemporal decompression was usually performed to relieve pressure and particularly to save vision menaced by choked disk, a procedure now well established in cranial surgery. In two of these cases, a large bone flap was turned down and converted into a decompression when no lesion was disclosed. At any rate, a definite attempt to reach a tumor was not made.

C. Undisclosed.—Six times a definite attempt was made to remove a tumor, three times by a suboccipital approach, twice by a boneflap and once by a transsphenoidal approach.[13] The lesions were not disclosed, and although in two cases in which a boneflap was turned down a cerebral glioma was certainly present, since a fragment was not removed for histologic study, these cases could not be listed as verified. Also by a suboccipital approach, it was impossible to verify a deep lying cerebellar glioma which had not broken down and become cystic. That the difference between verification and nonverification may depend on a very small thing is shown in the case of P. P. (Surg. No. 10883) in which a fortunate puncture deep into the cerebellum struck a small gliomatous cyst from which a few drops of characteristic yellow fluid were secured. He would otherwise have been included in this group. On the other hand there has been already noted under Group I, *D* the case of L. McN. (Surg. No. 11187) originally placed in this group, who came to necropsy after this article was begun.

The cases in Group II are not so interesting as those in Group I. The presence of tumor was not doubted from clinical examinations, and during the operation nothing occurred to cast suspicion on the diagnosis.

III. VERIFIED BRAIN TUMORS: SIXTY-THREE CASES, 53.39 PER CENT.

This group will be dismissed with a few remarks. A number of cases have been already noted. They present few difficulties in classification except for the pathologist, and with the difficulties of pathologic diagnosis we are not here concerned. It will be noted that although the tumors verified include only 53.39 per cent. of all the cases quoted in this series, if we include only Groups II and III, they constitute 72.4 per cent. of the actual tumor cases (so far as it is possible to estimate the exact number at the present time). If we again exclude the unoperated cases in Group II, *A*, 85.13 per cent. of the operated tumor cases were verified. The members of this group were distributed pathologically as in the accompanying tabulation.

It is, of course, apparent that, in nearly two thirds of the cases, symptoms referable to the brain arose solely from the fact that the structures from which the tumors originated were enclosed in the cranium along with the brain. It will be observed that in this series the gliomas alone arose from the brain tissue. As has been often

13. This patient suddenly became unconscious, Sept. 15, 1920, while at work. He was taken to the Boston City Hospital where he died in a few hours. At necropsy there was found a tumor of the pituitary gland which had dissected its way extensively beneath the dura into the temporal fossae.

stated before it would be well to abandon the term "brain tumor" for the more accurate and suggestive term "intracranial tumor."

A. Verified at Operation.—Tumors were never classified as verified at operation without removal of a fragment for histologic examination, with one exception—the straw-colored fluid which coagulates on standing, contained in a gliomatous cyst, can scarcely be mistaken for anything else.

PATHOLOGIC DISTRIBUTION OF CASES OF VERIFIED BRAIN TUMOR

	Cerebral						Pituitary		Cerebellar		Brain Stem		Total
	Frontal	Precentral	Occipital	Temporo-sphenoidal	Basal	Cavum Meckeli	Intrasellar	Suprasellar	Intracerebellar	Extracerebellar	Pontine	Medullary	
Gliomas	1	3	1	5	1	..	..	..	12	..	..	1	24
Endotheliomas	2	3	2	2	..	1	..	2	..	..	..	.	12
Neuromas (acoustic)	.	..	..	..	..	..	..	..	..	6	..	..	6
Adamantinoma	..	..	..	..	..	1	..	..	..	..	..	..	1
Carcinoma	..	..	..	..	..	1	..	..	..	..	..	..	1
Tumeurs perlées	..	..	..	..	..	..	..	1	..	1	..	..	2
Adenomas (pituitary)	..	..	..	..	..	..	11	..	..	..	..	..	11
Congenital cysts	..	..	..	..	..	..	2	2	..	..	..	..	4
Epithelioma (Rathke's pouch)	..	..	..	..	..	..	..	1	..	..	..	..	1
Papilloma (choroid plexus)	..	..	..	..	1	..	..	..	..	..	..	..	1
Total	3	6	3	7	2	3	13	6	12	7	0	1	63

Many of the cases, except for accident, would of necessity have been classified as unverified. One case in point is E. T. (Surg. No. 10572). A glioma of the medulla oblongata was exposed at operation. It was evidently impossible to remove a piece of tumor for histologic examination although the nature of the condition was unquestionable. The patient subsequently died of respiratory paralysis and the history came up for discussion before the pathologist's report was received. I proposed that the case be put in Group III *A* as a tumor verified at operation, but Dr. Cushing protested. When the diagnosis of glioma was established by histologic examination of the necropsy specimen, and then only, was the case classified in Group III *D*.

B. Verified at Necropsy.—The single unoperated case is noteworthy for the reason that had necropsy been refused it would have been relegated to the group of suspects .

CASE 10 (P.B.B.H. Med. No. 11985).—*Abscess of the frontal lobe, with concurrent endothelioma. Death. Necropsy.*

Oct. 8, 1919, Frederick S., aged 50, an optician, recommended by Dr. Belle, of Waltham, Mass., was admitted complaining of "brain tumor."

Chronology of Symptoms.—For one year, occasional trancelike states had occurred at night. The patient would wake up and feel he could not move. For thirteen weeks there had been pain in the upper teeth on the left side spreading along to the eye and then to the head, lately it had been very severe in the left temporal region and constant, keeping him awake at night. Four weeks previously the left upper molar tooth had been removed for abscess at the root. For one week there had been occasional vomiting with slight nausea, photophobia, flashes before the eyes and failing vision. For five days he had suffered difficulty in swallowing and speaking and disturbance of the sense of smell and taste. For four days there had been rigidity of the neck and for two days he had been totally blind.

Positive Findings.—The rectal temperature was 99.8 F. There was rigidity of the neck. The reflexes were hyperactive. The pupils dilated without reaction to light. There were right external rectus paresis; complete left opthalmoplegia and profound stupor. The right optic disk was edematous, hyperemic and elevated ½ D, the left was elevated 1 D. The leukocyte count was 18,000.

Course.—October 9, poorly sustained ankle clonus was observed on the right side and positive Kernig sign on the left. October 12, transillumination of the sinuses was negative. October 16, the findings were ptosis of the left eyelid, ankle clonus on both sides and normal temperature. October 18, lumbar puncture revealed straw-colored fluid with 465 polymorphonuclear leukocytes per cubic mm. October 19, the patient died.

Necropsy.—This revealed dural endothelioma in the region of the sphenoidal wing in the left middle fossa; abscess of the left frontal lobe; purulent meningitis and suppuration of the left maxillary and sphenoidal sinuses.

Comment.—The whole course of this case distracted one's attention from the possibility of tumor. The only clue we get in the history is furnished by the story of peculiar trancelike states for a year previous to admission. Such states accompanied by a sense of unreality are well known in temporal lobe tumors and in this case were doubtless due to the tumor.

C. Verified at Operation and Necropsy.—The single case verified at operation, which subsequently came to necropsy (C. M., Surg. No. 11078), was an extensive glioma of the left cerebral hemisphere. This patient had been previously operated on by Sir Victor Horsley, presumably for jacksonian epilepsy.

D. Verified at Necropsy, Unverified at Operation.—Of the four cases unverified at operation and verified later at necropsy, one (M. C., Surg. No. 10252) was an extensive glioma of the thalamus with an advanced secondary hydrocephalus; another patient (T. H., Surg. No. 11462), had a bilateral papilloma of the lateral choroid plexuses; a third (E. T., Surg. No. 10572) an extensive glioma of the medulla oblongata; and the fourth (A. B., Surg. No. 10231) an extensive glioma of the right frontal lobe whose only symptoms were those of a suprasellar tumor. A transfrontal procedure was adopted with the last patient. The findings were negative, and death occurred some weeks subsequently at her home, the brain being sent to us by her physician.

Finally, it is important to call attention to the fact that in the last group of tumors, verified, the clinical picture was often no clearer than in the cases given under Group I, *B* or Group II, *C*. The following is an unusually valuable case in point.

CASE 11 (P.B.B.H. Surg. No. 10681).—*Endothelioma of left cerebral hemisphere with flaccid paralysis of right arm. Extirpation. Recovery.*

June 20, 1919, Dorothy R., aged 22, a student, was admitted complaining of paralysis of the right arm, weakness of the right leg and headache.

There had been panophthalmitis in the right eye, at 10 years of age, following an injury, accompanied by sympathetic inflammation of the other eye. Vision was much obscured in each eye.

Chronology of Symptoms.—In 1914, there were attacks of peculiar sensation, like an electric shock in the right hand. Later attacks involved the right arm and face. September, 1918, motor weakness began in the right arm. For one month, there was weakness of the right foot; for one month, headaches; for one week, vomiting following headaches. There was a vague history of rare attacks of twitching in the right arm elicited after much questioning.

Positive Findings.—No sign of sensory defect was detected except absence of abdominal reflexes on the right side. There was marked hypotonicity of the musculature of the entire right half of the body, most marked in the right arm, which showed total flaccid paralysis except for slight movement in the biceps and deltoid. Motor weakness, so marked in the arm, was slight in the leg and barely perceptible in the face. Tendon reflexes were exaggerated on the right side, very slightly exaggerated in the arm, more so in the leg. There was a suggestive Babinski sign and a poorly sustained ankle clonus on the right. There was atrophy of the interossei muscles of the right hand. Accurate ophthalmoscopic and perimetric observations were impossible because of cloudiness of the media from old inflammation.

Clinical Diagnosis.—Endothelioma of the left precentral region was the diagnosis.

Operation.—Osteoplastic exposure of the left cerebral hemisphere was performed July 8, 1919. A 32 gm. nodular endothelioma was removed from the precentral area.

Discharge Diagnosis.—Brain tumor was verified: endothelioma.

Comment.—This patient had been treated by an excellent neurologist for a "neurosis" and by another for an "occupational neuritis." She was at that time studying with a famous pianist. The total absence of spasticity, the marked hypotonicity, the absence of sensory signs, the vagueness of the history of motor attacks elicited after questioning and possibly due to suggestion, the slight but unmistakable atrophy of the interossei of the right hand, the absence of subjective symptoms of headache and vomiting since admission, the difficulty of making proper opthalmoscopic examination, all these things made it very hard to come to a decision in this case. Furthermore, she was the only child of very evidently psychopathic parents. She was kept under observation for some time, and operation was finally decided on as a result

of exacerbation of headaches and vomiting, coupled with the presence of a Babinski sign and ankle clonus in the right foot. Undoubtedly, if she had come to us a month earlier, before headache and vomiting had appeared and possibly before the development of motor signs in the right foot, no operation would have been undertaken.

SUMMARY

There has been given an account of the method used to classify clinically patients having, or supposed to have, intracranial tumors, in the hope that it will be of value in interpreting statistics from this clinic and perhaps assist in unifying general usage in this regard.

My thanks are due to Dr. Harvey Cushing for permission to publish these cases as well as for valuable suggestions in the preparation of this article.

THE DANDY METHOD OF LOCALIZING BRAIN TUMORS BY THE ROENTGEN RAY

WITH REPORT OF A CASE

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TOPEKA, KAN.

The indispensability of roentgen-ray examinations in general medicine is well recognized. Few physicians realize, however, how much assistance the roentgen-ray picture of the skull and of the spine can afford the neurologist and the psychiatrist. Certain cases of congenital brain syphilis, of traumatic epilepsy, of pituitary disease, of cerebral arteriosclerosis, of cervical rib and of a few other conditions have, in our experience, been diagnosticated chiefly on the basis of the roentgen-ray findings.

Nothing is more disappointing, on the other hand, than the roentgen-ray findings in brain tumor. There are few cases of brain tumor in which the roentgen ray gives us any information other than that which we already possess from clinical findings. It is usually of no help in localization.

All of this is, perhaps, on the point of being radically changed by the principle of photographing the ventricles of the brain filled with air. This idea was suggested and put into practice by Walter E. Dandy of Baltimore, who showed that when ventricular fluid was removed and air injected, a roentgen-ray plate showed sharply the outlines of the ventricles. A tumor present in the brain is likely to encroach on the ventricle at some point or another and this distortion would clearly show in such a roentgen-ray photograph. The procedure, then, is to make a small trephine opening in the skull, insert a long needle into the ventricle, remove the cerebral fluid, inject air, photograph with the roentgen ray, and compare with similar photographs of normal ventricles.

The present opportunity is much too limited to present the entire theory of the interpretation of these plates. This has been done by Dandy in six or seven contributions, and the procedure will be exemplified by a case of my own.

I am quite aware that the following case is not a perfect illustration of the advantages of Dandy's method. While there is apparent correlation of the clinical diagnosis and roentgen-ray findings, it is a point of great regret that surgery did not confirm the diagnosis and effect the treatment. I think we should not be the least disheartened

by this for the reason that in all human probability there will long remain problems of treatment even after the diagnosis is indisputably made. The attempt at surgical removal in this case was made, and the fact that it was unsuccessful is not a reflection on the surgery, for such failure has long been a common surgical experience; nor, on the other

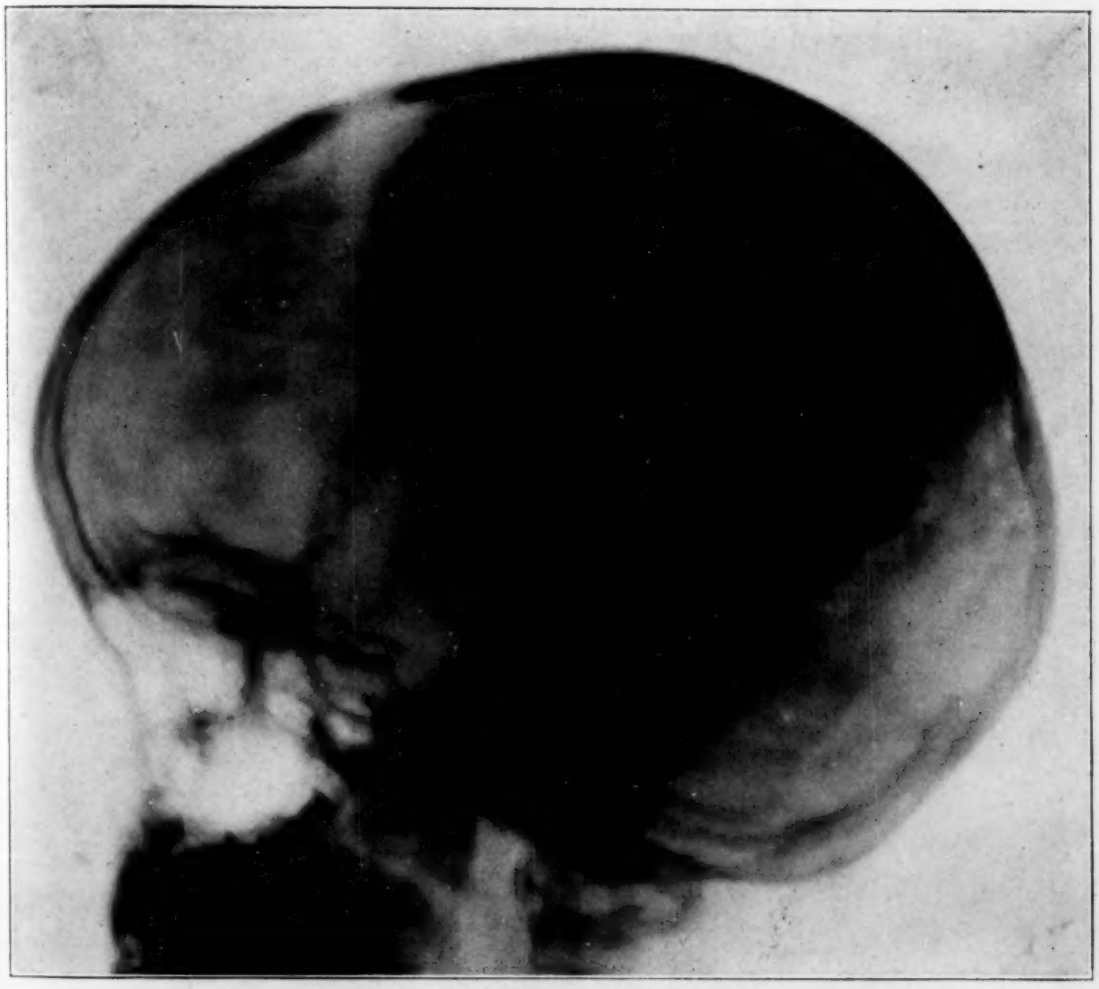

Fig. 1.—Stereoscopic illustration showing no abnormality except a shallow sella and evidences of tremendous intracranial pressure in the separation of the sutures.

hand, is it a reflection on the diagnosis, for there is little doubt, everything considered, about the correctness of this. On the whole, there is reason to believe that this method will be of tremendous value in the more accurate localization of brain tumors.

CASE REPORT

History.—F. S., Case 206, was a lad of 6 referred by Dr. J. F. Shelley of Elmdale, Kan. His family history was negative except for the following facts: A second cousin of the father was said to have been insane and to have had epilepsy. The father also had a sister subject to sick headaches. The father was of English descent, the mother of mixed ancestry. Both were fairly typical

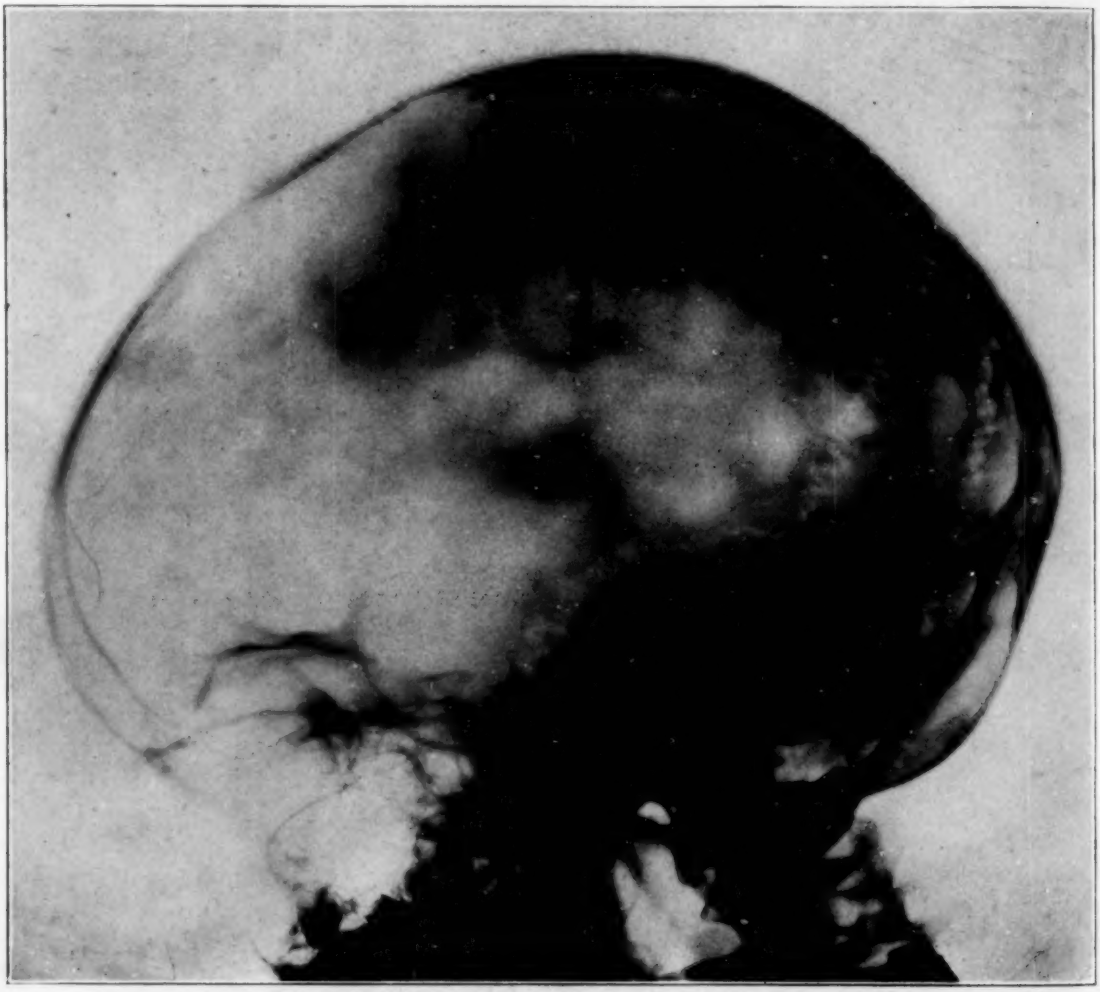

Fig. 2.—Left side of the head. The ventricle has been filled with air. It is not encroached on at any point but is uniformly dilated to about three times the normal size.

rural folk, aged 44 and 42, respectively. There were three other children, aged 11, 4 years, and 6 months, all in good health.

The child was born at full term, normal delivery, was breast fed and began walking, talking and teething at the usual ages. He had the nail-biting habit, but there was no history of convulsions, enuresis, etc. He had always been

well, except for occasional attacks, when he would wake up with a headache, vomit and then feel all right. He had had several accidents, such as falling off of a hay wagon and being run over by a lumber wagon, but with no ill effects so far as known. Although he had not been to school, he had learned to count to 20 with a few mistakes. His social and temperamental reactions were normal.

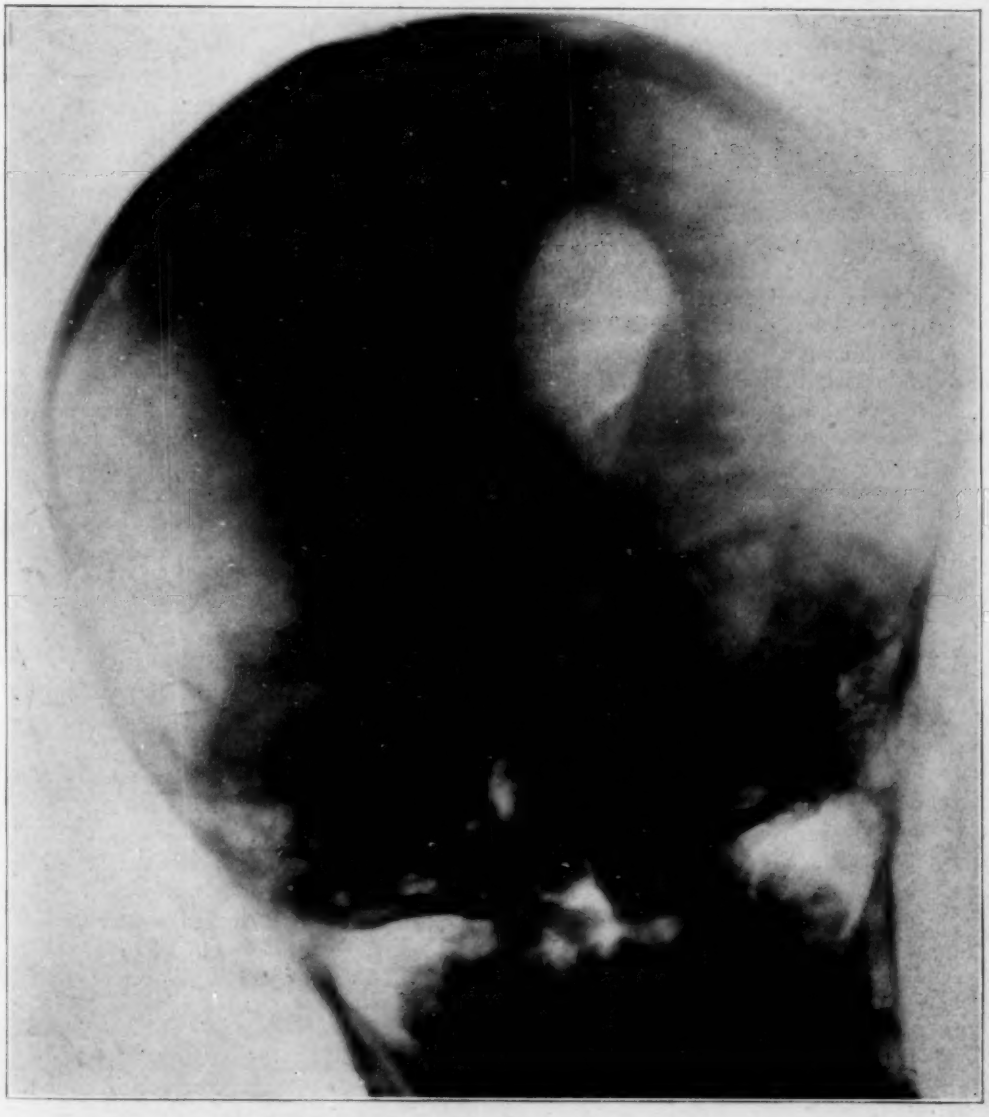

Fig. 3.—An anterior-posterior view of the head after the injection of air. This picture was taken with the subject in a prone position.

Present Illness.—In November, 1919, he had had scarlet fever of moderate severity, followed by slight albuminuria. Headaches of marked severity, especially over the frontal regions, were noticed shortly afterward. Headaches had

been noticed for several years as mentioned in the foregoing, but they now became prominent and occurred every day, and were more severe at some times than at others. Vomiting nearly always occurred in association with them. It was not projectile and did not always relieve the headache. The urine was negative. He was given some salicylates and seemed to improve.

Nearly three months later he was again brought to the physician's office with the report that the headaches had increased in severity. For two weeks he had been holding his head tipped to the left, and he once complained of not seeing well. Although he had not fainted or fallen, he had difficulty in walking and the physician thought there was a tendency to veer to the left. He was untidy at the table and was restless and fidgety all the time. He had had no fever.

Physical Examination.—He was first seen by me on April 19, 1920. At that time I made the following notes: bilateral choked disks; pupillary reaction normal but left pupil irregular in outline; visual acuity not greatly diminished; head tipped to the left; slight left facial paresis; tongue and uvula deflected to the left; positive Macewen's sign; no speech defect; hypotonus of the fingers, especially of the left hand; reflexes generally normal; positive Romberg sign; bilateral Babinski and Schäfer's reflex; erection of penis when abdomen is scratched, and staggering gait. Special cerebellar tests were made following the schemes of Weisenburg, Tilney, and others.

The Bárány tests of past-pointing were used. With the right hand there was almost always a spontaneous deviation to the left of from 5 to 20 cm., usually about 10. This was true whether the horizontal or the vertical plane was used. With the left hand the deviation was not quite so constant nor quite so marked, but there was some deviation to the left apparent with both planes. Stimulation of the internal ear was not done.

Babinski's five tests of asynergia minor were nearly all positive. The leg was raised in two movements instead of one, the body was flexed before the leg in attempts to sit up (in fact, the legs were never flexed, but were raised stiffly with the buttocks as a pivot). Touching points with his toes was inadequately and jerkily done. Kneeling on a chair was not tried. He was unable to lean backward and failed to make proper coordination of the legs when it was attempted.

Andre-Thomas tests for dysmetria were made. The grasping of a glass of water, the supination of the palms and the awkward heel to knee placing were suggestive but not convincing. Babinski's adiadokokinesis tests were distinctive, the left arm being much worse than the right. The rebound phenomenon of Holmes was slightly present on both arms.

Trunkal asynergia was manifested in the saddle gait which showed cerebral walking rather than cerebellar. He could sit for a long time and had more difficulty with his eyes shut than with them open. In other words, he seemed to have a positive Romberg sign. Fournier's tests of gait were found inconclusive.

Laboratory Findings.—The blood and urine were normal. The spinal fluid pressure was greatly increased. The globulin test was positive; the Wassermann and colloidal gold tests were negative.

Roentgen-Ray Examination.—Stereoscopic roentgen-ray examination (before trephining) of both the right and left sides of the head showed marked evidence of intracranial pressure. The suture lines were wide open, especially in the region of the anterior fontanel. There was no evidence of a sella.

Visual Fields.—The visual fields were studied by Dr. C. L. Williams on April 9 and showed marked contraction, approximately equal on both sides, and in both instances averaging only about 15 degrees. They were fairly round.

Treatment and Course.—On April 22 the spinal fluid was secured. It was under great pressure and following the removal of a small amount the choked disk receded noticeably and the facial and eleventh nerve palsies largely disappeared. His gait was better than before.

On May 11 a small trephine opening was made at the vertex, the ventricle tapped by means of a lumbar puncture needle and 50 c.c. of cerebral fluid removed, the same amount of air being injected gradually as small quantities (10 c.c. at a time) of the fluid were removed. Roentgen-ray plates were made before the patient came out from under the anesthetic. There was a slight reaction of fever and vomiting, but this was not serious and disappeared after thirty-six hours. The patient was much better after this. Splashing of the cerebral fluid could be heard at a distance of several feet when his head was shaken.

Nystagmus was detected for the first time on May 14, although it had previously been looked for. When the eyes were directed to the right there was a definite nystagmus with a slow component to the left; when the eyes were directed to the left there was a nystagmus with a slow component directed to the right.

As the roentgenograms show, the diagnosis of cerebellar tumor was adequately justified. In the first place, there was an obvious hydrocephalus. This is shown by the lateral views. The anterior-posterior view taken with the child in the prone position, shows that the two lateral ventricles were dilated symmetrically and equally. Fluid removed from the left ventricle must drain through the third ventricle into the right ventricle, into which the needle was inserted, and this illustration shows that the drainage was apparently incomplete. That it was a technical fault appears probable from the fact that the ventricle did receive enough air to outline it distinctly, and the haziness is caused by the pool of fluid in the anterior horn of the ventricle. The approximate equality in dilatation of the two ventricles and the fact that they are not displaced from the midline shows, according to Dandy, that the obstruction (neoplasm) is cerebellar, between the aqueduct (or foramen of Monro) and the foramen of Magendie.[1]

I am indebted to Dr. Samuel T. Orton for the suggestion that this statement of anatomico-pathologic principle is scarcely broad enough. Any obliterative focal pressure exerted on the acqueduct of Sylvius behind the anterior end would cause the same result (equilateral hydrocephalus). That this need not be restricted to cerebellar tumors must be obvious from a consideration of the outlines of this region. Tumors springing from the corpora quadrigemina, for example, or from almost any point in the floor of the fourth ventricle, could and likely would

1. Dandy says: "Except in rare instances only tumors in the brain stem or cerebellum can produce a symmetrical bilateral internal hydrocephalus," Surg., Gynec. & Obst., April, 1920, p. 338.

produce the same picture, and of course, an inflammatory process with blocking of the acqueduct would produce the same effect, as Dandy [2] himself has illustrated.

We need, then, to look well to the clinical (neurologic) indexes, and if these fail, it is doubtful that we are justified in positively concluding that the lesion is a cerebellar one.

Further Course.—In this particular case the neurologic indications seemed well confirmed by the ventriculographic plates (or vice versa). Operation was attempted a few days later. A bone flap was reflected in the occipital region, and neither inspection nor palpation revealed a tumor. The patient reacted poorly to the anesthetic. Constant blood pressure readings were made, and after about thirty minutes, the rising pulse and falling pressure made it seem wise to discontinue the search, and the wound was closed.

The patient made a poor recovery from the operation and was for many days stupid and at times delirious. He had a few convulsions during the second week. He gradually regained strength and was removed from the hospital. He has not been seen since.

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2. Dandy: The Diagnosis and Treatment of Hydrocephalus Resulting from Stricture of the Acqueduct of Sylvius, Surg., Gynec. & Obst., October, 1920.

News and Comment

DR. PEARCE BAILEY, RECEIVES DISTINGUISHED SERVICE MEDAL

Dr. Pearce Bailey, New York, who was chief of the Division of Neuropsychiatry in the Surgeon-General's Office during the World War, has been awarded the distinguished service medal. The citation is now in the hands of Surgeon-General Ireland and will shortly be presented to Dr. Bailey at his home.

AMERICAN NEUROLOGICAL ASSOCIATION MEETING

The next meeting of the American Neurological Association will be held in Atlantic City, N. J., in the Hotel Chelsea, on June 13, 14 and 15, 1921.

Abstracts from Current Literature

SUR UNE FORME BENIGNE DU SYNDROME DE BROWN-SEQUARD (A BENIGN FORM OF THE SYNDROME OF BROWN-SEQUARD).

S. GOLDFLAM, Rev. neurol. **35**:673 (Sept.) 1919.

The author reviews briefly the history of the diagnosis and treatment of Brown-Séquard cases: he says that, at first every case not definitely due to trauma or hematomyelia was regarded as syphilitic, and that one must be constantly on guard against forgetting this etiologic factor. He then speaks of how, in the past twenty years, especially, cord tumors have come to be recognized as etiologic of the syndrome. Then there came a time when it was regarded as a grave error if exploratory laminectomies were not made in every suspected case of cord tumor, this being followed by the inevitable reaction to this attitude because of serious postlaminectomeal results. Then when, instead of a tumor, one found at operation increase of fluid between the membranes resulting in pressure symptoms, there arose such classifications as meningitis spinalis, serosa chronica circumscripta, subarachnitis chronicans circumscripta, or so-called "meningeal cyst." If such a cyst appeared above or below a cord tumor, exact localization became all the more difficult. Even at the present time it is difficult and, at times, impossible, to differentiate between a meningeal cyst and a tumor. Frequently the symptoms are as varied and atypical as in multiple sclerosis. This is especially true of multiple sclerosis at the sacral level of the cord when the Brown-Séquard syndrome is present. Then there are (as demonstrated by Oppenheim) cases which present symptoms of cord tumor where the primary lesion is of an inflammatory nature involving the conus medullaris and the cauda equina.

It is not a rare thing to have all the clinical symptoms of a tumor of the cauda equina, and yet on operation fail to find anything abnormal, either microscopically or macroscopically. There are cases such as those reported by Nonne and Freud in which necropsy revealed inflammatory conditions of funicular myelitis instead of tumors. Nonne and Freud also repudiated the idea popularized by Lichtheim that funicular myelitis was fatal; instead, according to them, the condition may remain stationary or even regress. Fleischman is of the opinion that there are benign and even abortive forms of myelitis. This he thinks is especially true in cases of alcoholic etiology.

The former opinion that the Brown-Séquard syndrome was indicative of a progressive and fatal course has given way to a more hopeful attitude in the light of the recovery of many patients with typical cases. Boettiger reports a case in which the patient was entirely cured at the end of ten years.

Oppenheim was the first to call attention to a form of the Brown-Séquard syndrome which occurred chiefly in men between the ages of 40 and 50.

The clinical picture is usually the same, with the typical Brown-Séquard syndrome: dorsal localization, bladder trouble and usually impotence. The patient can usually walk. There is hypertonia, exaggerated reflexes and the Babinski sign. There is also pronounced weakness of the opposite leg. There is usually the reflex of Rossolimo or some spastic phenomenon. Sensory disturbances are variable, pain being present in great degree or totally absent, by preference on the dorsal aspect of the foot. Girdle pains are exceptional;

radicular pains never present. The status of paresthesia and anesthesia is almost as variable. Sensory disturbances usually appear on both sides of the ventral aspect of the trunk. Oppenheim regards the evolution of the syndrome as most important, and the following is typical: the lesion begins in the subacute form and reaches the crisis within a few months, although in some cases it may last for years. The process may be ameliorated or arrested, but never completely cured.

The author then reverts to an article of his own which appeared as early as 1908, in which he used the phrase, "a benign form of the Brown-Séquard syndrome." He then adds that some of these cases not only show a tendency to amelioration, but even complete cure. He bases this opinion on cases that have run from four to ten years, and reports five cases.

The five cases reported are interesting in that the patients all were robust men between the ages of 29 and 50, none had syphilis or tuberculosis, and none showed an infectious-toxic process, such as that of alcohol or pernicious anemia. The clinical picture for the most part is uniform, that of the usual Brown-Séquard syndrome. One of the most striking symptoms was the loss of sexual power. Vesical symptoms were uniformly mild. The author then goes into detail relative to the various symptoms, one of his most significant remarks being that the phase of sensory disturbance is synchronous with that of disturbance of motility. His résumé of his cases includes a discussion of what he calls the period of progression, the stationary period, and the period of regression. The period of regression is often interrupted by relapses which may last for months or for years. Bladder and bowel symptoms may disappear entirely. Paresthesias may become less marked, but impotency usually persists. Amelioration seems to persist. One may speak of cures in the sense that the patient attends to or returns to his occupation learning to ignore his milder symptoms. But there are true relapses, with, perhaps, exacerbation of all the symptoms, especially in the field of motility.

To sum up: It may be said that the characteristic element of the Brown-Séquard syndrome is the slow insidious development of the symptoms without apparent etiology in men of middle age. Even at the height of the illness the symptoms are not severe, but the clinical examination shows that they are not functional, but rather weakness or hemiparesis of the spinal type. There are never symptoms in the upper extremities or of the cranial nerves. The second or stationary phase may last for years, after which there may supervene a phase of regression of equally long duration. In all the phases there may be recrudescences. Cure is durable though there may persist insignificant symptoms.

The author believes that the benign form of this syndrome is more frequent than cord tumors. It is necessary to give more attention to the differential diagnosis and keep in mind the following symptoms: slow onset, slow development, chronicity, preponderance of paresthesias (especially thermic in one leg), absence of intense pain, etc. On the other hand, one must not forget the difference between the insignificant subjective symptoms and those revealed by objective examination which establishes the lesion in the dorsal portion of the cord. It is also necessary to exclude syphilis, especially gumma localized in the dorsal portion of the cord. In the latter, the course is not so steady, and is amenable to antisyphilitic treatment whereas in the benign form of the Brown-Séquard syndrome, such treatment has no favorable result. Syphilis of the cord, not treated, is almost always fatal; sooner or later complete paralysis, retention of urine, cystitis and all of its consequences follow.

Multiple sclerosis must also be excluded. Here the diffuseness of the lesions is characteristic. The most difficult task is to rule out spinal cord tumors. Because of the great prognostic difference, the author discusses the question as to whether laminectomy is justifiable. Even when a tumor has not been found, it has been said improvement frequently follows decompression, and even when we cannot say just why. The writer cites one case of a patient, who died three weeks after operative procedure, as an example of the necessity of making a careful differential diagnosis. Tumors of the meninges and intramedullary tumors cause the most difficulty.

It is during the first phase of such cases as those of the author's that the greatest diagnostic difficulties arise, when it is difficult to rule out tumor of the cord, not the typical meningeal tumor with characteristic root pains, but those in which the symptoms are comparatively mild.

The difficulties of diagnosis increase when we have atypical cases of meningeal tumor, when there is little pain, or when the root pains are absent and displaced by paresthesias. Cord tumors rarely show medullary symptoms (sensory and motor), except at a rather late stage, whereas in the type of case discussed by the author, such appear early.

In cord tumors, the motor symptoms usually appear earlier, whereas in these cases of the benign form of the Brown-Séquard syndrome, the motor and sensory symptoms may be of equal intensity, although the sensory symptoms are usually the more pronounced. Weakness appears early, whereas in cord tumors, it is late. In cord tumors the symptoms of hemiparesis rarely form an episode; they are usually abrupt in their onset and usually are progressive to the terminal stage.

Remissions are rare, whereas in the benign form under discussion, remission is usually one of the most pronounced features in the clinical picture. The remission may be followed by a relapse, but this in turn by another remission. In cases of cord tumors, this is not true, and the relapse is often dangerous to the life of the patient, and the periodicity of the relapse is part of the clinical picture in tumor cases. In the latter the development is usually not as gradual as in the author's so-called "benign" cases. It is the author's opinion that too much emphasis must not be laid on the "syndrome compression" (increase of globulin, frequent xanthochromia, and lack of pleocytosis in the spinal fluid) as diagnostic of cord tumors. He cites Oppenheim's experience in this respect.

On the other hand, the writer lays the greatest emphasis on the necessity of making a sharp differential diagnosis to the end that one may know when surgical procedure is imperative. He lays down the axiom, that in tumor cases, the patient must not be allowed to pass what he styles the "second phase"; that is, the phase of the Brown-Séquard syndrome. Laminectomy should always be resorted to before this stage is past.

When in atypical cases we notice a steadily progressive course with accentuation of motor symptoms, we know that we are approaching the period or phase of transverse lesion. This is the danger signal and surgery is imperative. These observations on differential points in diagnosis hold just as truly for so-called arachnitis serosa circumscripta spinalis as for cord tumors. He believes that there is little difference between the symptomatology of the cystic tumor and that of the solid tumor.

He then discusses Boettiger's adoption of the term "pseudomedullary tumor" as analogous with "pseudocerebral tumor," and as applied to those supposed tumors in which there followed during the course of the disease a total amelioration of the conditions presented. He cites Nonne and Alzheimer as authori-

ties for cases, in which there were symptoms of spinal cord tumors, but which at necropsy showed no anatomic lesions. He notes that Alzheimer attributed the result to faulty methods of examination, but that Alzheimer, contrary to Oppenheim, thought the term "pseudomedullary tumor" should be preserved. They are rare and resemble, clinically, a tumor in the region of the conus medullaris and of the cauda equina. He thinks the adoption of the terms "pseudomedullary, and pseudocerebral, tumors" should only be regarded as provisory, and that they simply express our ignorance of the actual conditions in such cases.

The danger always lies in mistaking the condition, and being under the necessity of making a prognosis of a fatal condition or of mistaking a true tumor for the so-called pseudotype. In the cases presented by the author, different conditions obtain. They are that form of the Brown-Séquard conditoin which is characterized by spontaneous improvement, the latter being their essential attribute.

The final paragraph is concerned with the "therapeutic rationale" of the so-called benign type with which the paper deals. It is difficult to speak of therapy when the etiology is so obscure, and when the recovery is spontaneous. "Specific" treatment is without effect. If improvement follows, it is probably a coincidence. The value of hygienic living cannot be denied, but one patient reported by the author improved under most unfavorable hygienic conditions. Certain patients ascribe their recovery to mineral baths; others to simple baths. With this diversity of lay opinion in view of the spontaneous character of recovery where it occurs, it is needless to say that we are ignorant of what is actually taking place during the course of the disease. The important fact remains, however, that there is a benign form of the Brown-Séquard syndrome.

JONES, Detroit.

LES TUMEURS DIFFUSES DES PAROIS VENTRICULAIRES (NEUROBLASTOMES ENBRYONNAIRES) ETUDE CLINIQUE ET HISTOLOGIQUE. (DIFFUSE TUMORS OF THE VENTRICULAR WALLS—EMBRYONIC NEUROBLASTOMAS. A CLINICAL AND HISTOLOGIC STUDY). E. C. CHRISTIN and F. NAVILLE, Schweizer Arch. f. Neurol. u. Psychiat. **7**:49, 1920.

The case reported by these authors is exceedingly rare and interesting, both from the clinical and histologic standpoints, so that some of the findings will be discussed somewhat in detail.

The patient was a woman, 54 years of age, with negative family history, who complained of attacks of sudden, intense vertigo and frontal headaches. A bilateral facial paralysis, simultaneous in onset on both sides, appeared rather abruptly. There was progressive general muscular enfeeblement, the sensorium was intermittently clouded, with periods of amnesia; euphoria was at times pronounced. Examination showed a complete paralysis of the left internal and both external recti; the eyes could be turned freely upward and downward. Superficial sensation was slightly diminished over the left trigeminal distribution. The facial muscles were paretic on both sides, more so on the left; no fibrillary tremors were noted. The palate was freely mobile. The cochlear portion of the eight nerve was normal; the Bárány test was unsatisfactory on account of the ocular paralysis, but as far as it could be carried out, was negative. Both tendo achillis reflexes were abolished. A Wassermann test of the blood was slightly

positive. The diagnosis was uncertain, tumor of the base and myasthenia gravis being considered.

A month later the facial muscles had become completely paralyzed, the patellar reflexes were abolished, there was general asthenia and marked somnolence. A week later there was projectile vomiting and somnolence alternated with delirium. The myasthenic reaction of Jolly was negative. A slight reaction of degeneration was noted over the facial muscles. Fundus examination was negative throughout. The patient was presented before the Medical Society of Geneva, at this time, as an atypical case of myasthenia gravis. The headaches and vomiting continued, as did the progressive cachexia. The spinal fluid contained 26 cells to the c.mm. and 0.2 per cent. albumin. Death occurred about three weeks later.

Necropsy showed some edema of the meninges, slight thickening over the frontal area and a recent hemorrhage near the left first frontal convolution. The exterior of the brain looked normal, and there was no flattening of the convolutions. The arachnoid was somewhat adherent to the right third, sixth and eight nerves. The ventricular fluid was filled with floating particles. The walls were clothed throughout by a soft, pink, friable, fatty tissue, which the slightest touch sufficed to lacerate. The only interruption of this layer was found at the extreme points of the temporal cornua. It varied from 3 mm. to 1.5 cm. in thickness. The walls of the aqueduct of Sylvius were included, however, the canal was neither obstructed nor dilated; the tumor completely filled the fourth ventricle and even extended a few millimeters down the medullary canal of the cord.

The ependyma, on histologic examination, was found to be almost entirely intact, save here and there where it was completely absent and tumor cells could be found breaking through. The neoplastic tissue itself was made up of delicate fibers, in places closely resembling glia fibers. The blood vessels were everywhere much engorged. Some of the tumor cells resembled lymphocytes; however, there were others which were large and contained large vesicular nuclei and large nucleoli. Numerous mitoses were observed and giant cells were found here and there. The writers were of the opinion that the cells were essentially neuroblastic in type with a certain capacity for differentiating into either ganglion cells or neuroglia cells. They accordingly looked on it as a neuroblastoma.

Tumors of this type are usually found in the suprarenal glands and the sympathetic ganglions. They have been described in the retina. In the nervous system, they are exceedingly rare; in addition to this, the curious distribution found in this case makes it unique. They were able to find six cases reported in the literature, in which involvement of the fourth ventricle alone was the most common. The localization was attributed by Burns to metastases carried in the current of the cerebrospinal fluid. They were reported under the names of sarcoma, embryonic cell glioma approaching syringomyelic gliosis, and ependymal cell glioma.

Tumors of this type have been classified on an embryologic basis by several writers. In the first group are included the neuroblastoma and the sympathoblastoma or ganglioma embryonale sympathicum, made up of undifferentiated nerve or sympathetic cells. In the second group are tumors derived from the chromaffin cells. In the third group is included the ganglioneuroma simplex made up of adult nerve elements with or without myelin, ordinarily benign and appearing in all portions of the body. The last group comprises tumors known

as ganglioneuroblastomas, which includes adult and embryonic elements in varying proportions, appearing either as diffuse growths or as separate nodules.

The writers feel that the ependymal wall does not take place in the formation of these tumors; this opinion, however, is not uniformly accepted. They also think that the tumor proliferation was diffuse from the outset rather than that it started from a limited and isolated center. This conclusion is based on the fact that the ependyma was almost uniformly free from involvement.

Clinically the case presented some interesting features. There was at no time a choked disk. This has been an inconstant finding in tumors of the ventricles, and the writers do not share the opinion of Bollack that choked disk is pathognomonic of dilatation of the third ventricle. They share Reichardt's opinion that it is more likely based on the cerebral reaction to neoplastic irritation. In this case the aqueduct of Sylvius was patent, and there was no evidence of intracranial pressure. The facial paralysis and the paralysis of the external ocular muscles were due in part to neoplastic infiltration and in part to edema. Cerebellar symptoms are frequent, and according to Cimbal, are due to compression, although it may be very slight, on the particularly fragile cells of Purkinje. There is no pathognomonic symptomatology. The symptoms found, however, included progressive apathy, intellectual clouding with amnesia, delirium and agitation, very pronounced muscular asthenia, and progressive amblyopia at times with papilledema and atrophy. On the other hand, there is no impairment of superficial sensibility and no noteworthy involvement of the pyramidal tracts. The diagnosis can never be made with certainty during life. The clinical resemblance to myasthenia gravis is sometimes striking.

WOLTMAN, Rochester, Minn.

ZUR KENNTNIS DES TROUSSEAUSCHEN PHANOMENS BEI DER TETANIE (INFORMATION PERTAINING TO THE TROUSSEAU PHENOMENON IN TETANY). HARRY SCHÄFFER, Deutsch. med. Wchnschr. **46**:1073 (Sept. 23) 1920.

The Trousseau sign is considered by the author to be pathognomonic of latent tetany. He discusses his subject from three standpoints.

1. Is the Trousseau sign due to an anemia of limb, or is it due to a stimulation of nerve fibers?

In answering this question the author reviews the work of Schlesinger who shows that the anemia is not the cause of the tetany, but that it is due to stimulation of nerves as demonstrated by the work of Frankl-Hochwart on dogs. Schlesinger showed that in cases of tetany a forced flexion of the thigh in hip, and extension of knee, produced a tetany of the foot in extreme supination, no influence having been exerted on the vascular circulation, the phenomenon being due entirely to a nerve condition. Schlesinger considered that the Trousseau phenomenon would be based on the same condition.

In obtaining the Trousseau sign by means of blood pressure apparatus, it was found that the tetany could be obtained with a pressure slightly less than the diastolic; thus blood pressure—systolic 90, diastolic 60, tetany with 55 mm. of mercury—strong, 45 mm. of mercury—weak, 40 mm. of mercury—none. Several other cases are cited. Occasionally it was found necessary to have the pressure slightly above the diastolic pressure, and it was always possible to feel the radial pulse during such a produced tetany.

The author feels from the array of work done that one is justified in considering the Trousseau sign due to nerve stimulation and not to anemia.

2. Is the Trousseau sign a reflex act?

Increased irritability of motor nerves does not lead to a Trousseau sign. This finding, according to the author, makes the reflex theory possible. Frankl-Hochwart established the reflex quality by producing a bilateral Trousseau sign with constriction of one limb. This was not a constant finding. Another important observation is the fact that the Trousseau sign develops slowly—a summation of stimuli; which would be due more likely to ganglion stimulation than irritation of peripheral nerves, the latter possessing this quality only to a slight degree.

An experimental method for the determination of the nature of the tetany is to be found in a study of the "action current" or potential of the muscle during tetany. According to Piper, voluntary muscular action is characterized by nerve impulse rate which has been demonstrated to be about 50 per second, and called by him rhythm. This rhythm appears to be more marked and distinct as the stimulating impulse is increased. Where this rhythm of 50 is marked, it speaks for the voluntary innervation; that is, for the innervation of the muscle by its anterior horn cells.

If one stimulates the nerve with faradic current, the "action current" curve will show a similar frequency. If the stimulation is kathodal closing tetanus the "action current" curve will show more oscillations, unequal and have a smaller amplitude, and cannot be confused with the curve of a voluntary innervation. During the muscular contraction occurring in a Trousseau phenomenon an "action current" curve of rhythm 50 per second is obtained. For this work a Saitengalvanometer was employed. The author describes the technic and apparatus, illustrating with three cases and several charts.

In the cases, first the voluntary "action current" curve and then the Trousseau "action current" curve were determined. In each case the two curves were practically the same, showing a rhythm of about 50 per second. This work showed that the muscles in a Trousseau phenomenon obtained their impulses in a rhythm of 50, identical to that found in voluntary innervation. This, according to the author, points to an involvement of the central nervous system in the tetany, as such a picture is never obtained by peripheral stimulation.

The Trousseau sign is due to reflex action, and, according to Schäffer, most authorities have come to this conclusion. This agrees with the opinion held by many, namely, that the spinal cord plays a part in tetany. It seems certain that the tetany has its origin in the anterior horn cells and not in the peripheral portion of the neuromuscular apparatus.

3. Even though the Trousseau phenomenon is usually looked on as being tetanic, may it not have a tonic element?

If one observes the thenar and hypothenar eminence, while eliciting a Trousseau sign with gradually applied constriction, one will see a fibrillary contraction of these muscles prior to the tetany. This fibrillation may be kept stationary by the regulation of the pressure, and frequently may constitute the only sign of the phenomenon. Heightened irritability of nervous elements has been suggested and Strümpell called attention to an athetoid movement replacing a Trousseau; that is, a disturbance of the myostatic innervation, the usual form being myomotor. On this ground the Trousseau sign appears as a combination of tonic and tetanic elements in which the former are stimulated by light impulses, as noted in the onset of tetany, greater stimuli producing a reaction in both elements.

An "action current" curve is recorded by the author in a case in which the tetany of the forearm had continued uninterruptedly for six hours. The curve shows a typical fatigue; diminished frequency of oscillation, diminution in height, unevenness in amplitude and increased pauses between isolated oscillations. This curve is similar to that obtained in voluntary muscle fatigue.

The author concludes his article with the following summary:

1. The Trousseau sign may also be obtained in man by direct stimulation of nerve trunks in the median sulcus. Arterial anemia of the arm plays no part in the causation of the tetany.

2. The Trousseau sign may be obtained reflexly; the electromyogram shows a rhythm of 50 oscillations per second in voluntary innervation.

3. The Trousseau phenomenon is a tetany. Most probably the tonic function of the muscle is also involved.

4. The "action current" curve of muscles following prolonged tetany simulates that of voluntary innervated muscle in severe fatigue.

MOERSCH, Rochester, Minn.

THE MECHANISM OF INVOLUTIONARY MELANCHOLIA. W. F. MENZIES, J. Men. Sc. **66**:355 (Oct.) 1920.

We have in the presidential address to the Medico-Psychological Association of Great Britain a most unusual effort by Dr. Menzies. It is a curious combination of definite detail and the wide reaches of the indefinite. About half of the paper is concerned with data about the anatomy, physiology and chemistry of the conduction of the nervous impulse, disclosing a wealth of information: the other half attempts to connect these facts with melancholia, as known to psychiatrists. While there are many statements which arouse instant criticism and even denial, it is perhaps fair to think that the address as a whole is offered as suggestive rather than argumentative material.

Nowhere in the article can be found a definition either of "involutionary" or of "melancholia." We may infer that the author is considering any state of depression, quiet or active, occurring in the down grade of life. "The choice of involutionary melancholia was to eliminate the positive influence of thymus, thyroid and ovaries, which in presenility are more or less atrophic." So the title is not to be read as our term "involution melancholia."

The author states that the psychology of melancholia is the depressive emotion, and the anatomy of the depressive emotion is a sympatheticotonus, and the chemistry of a sympatheticotonus is an endogenous anoxemia. As a most important factor is excessive putrefaction in the intestine, a discussion of Lane's inclusive list of symptoms of enterostasis and of bacterial absorption follows. To understand (page 359) the connection between bacterial absorption and melancholia we need an anatomic basis, and this is found in the involuntary nervous system, whose embryology and physiology are sketched. The next step is to show that many of the phenomena which are produced by emotion and also by nervous outflow from the involuntary system are closely duplicated by the effects of epinephrin. "An emotional outflow is at one with the sympatheticotonus, and is accompanied by an increase of adrenalin" which is free by a complicated process to liberate from the liver an excess of glucose. Glycosuria is comparatively common in melancholia, and the amount of sugar in the urine varies with the amount of the depression (Raimann, Schultze, Goodhart, Bond, Toy, Knauer). Kooy in blood sugar percentages finds that melancholiac patients are above nor-

mal people and other mental patients. Reimann found lessened sugar tolerance in both excitements and depressions. Also "it would appear that in melancholia there is a chronic hyperadrenalism."

The author's description of the symptoms of states of depression is given rather fully, because much exception can be taken to its details. The heart is weak and the pulse frequent, soft. The systolic blood pressure in the erect posture is low. This statement seems remarkable to the reviewer in view of the statements in the article that when blood pressure was high, it was found to be in a case of chronic kidney disease; that atheroma occurs in almost every case of involutionary melancholia; that most such patients suffer from renal cirrhosis. Again, in melancholia the skin and viscera are poorly supplied with blood, as are the secretory glands. There is constipation and checking of the "normal hormonic train of digestion," especially at the pylorus. Accommodation is impaired and the pupils are large. In some patients a "proximal rigidity" (Stoddart) is shown.

Suprarenal extract, in comparison, relaxes smooth bronchiole muscle, counteracts fatigue, draws blood from the viscera to the lungs, the central nervous system and skeletal muscles, hastens coagulation and increases the sugar release from the liver.

So the author concludes that the state of depression is nothing more than a persisting sympatheticotonus, to which are added two complications sufficiently inclusive—bacterial toxemia from enterostasis and unconscious memory.

In putting forward the theory that in states of depression there is general anoxemia, the statement is quoted (Townsend and others) that in melancholia there is an increased excretion of potassium phenylsulphate and indoxylsulphate, and in the blood stream an undue amount of cholesterin, lecithin, phosphates and calcium.

It would be cause for the greatest congratulation if the contents of the blood stream in melancholia were as definitely known as the author implies.

Summarizing the views in this closely packed address: Involution and melancholia are concomitant, depending on different modifications of the fight by liver antitoxins against intestinal toxins, "the penalty of failure being deficient oxidation." In response to suboxidation appears a sympatheticotonus, the sensorimotor resultant of which is the depressive emotion. The supragranular layers of the cortex are so affected by lack of oxygen that association is diminished, and the infragranular layers allow unconscious memories to slip from under control.

BOND, Philadelphia.

DIE HISTOPATHOLOGISCHE ZUSAMMENGEHOERIGKEIT DER WILSONSCHEN KRANKHEIT UND DER PSEUDOSCLEROSE (HISTOPATHOLOGIC IDENTITY OF WILSON'S DISEASE AND PSEUDOSCLEROSIS). W. SPIELMEYER, Ztschr. f. d. ges. Neurol. u Psychiat. **57**:312, 1920.

Spielmeyer refers to a number of recent cases in which the similarity of the clinical picture between Wilson's disease and pseudosclerosis has led neurologists to believe that these two separately described affections are fundamentally the same. The writer has approached this problem from the histopathologic standpoint. The material for study consisted of seven cases: two personal clinical cases; three from Nissl's collection clinically diagnosed as lenticular degeneration with liver sclerosis and so verified by necropsy; one case of pseudosclerosis described by Fleischer and microscopically examined by Brodmann; and, finally, the original classic case of Hösslin-Alzheimer, which served as a control.

The writer recalls that Wilson's disease from the standpoint of brain pathology is held to be an elective degenerative process of the corpus striatum, the cerebral cortex showing no noteworthy changes. Alzheimer finds in pseudosclerosis (Westphal-Strümpell) the principal lesions in the corpus striatum, optic thalamus, subthalamic region, pons and dentate nucleus of the cerebellum, but lesions also occur in other parts of the brain and especially in the cerebral cortex. The essential pathologic picture is the occurrence of the giant glia cells with large lobulated nuclei poor in chromatin and with small cell bodies. They show no tendency to fiber formation and ultimately degenerate.

Fleischner's case corresponded in practically all particulars with Alzheimer's case of pseudosclerosis. In the personal cases of the author, in which the clinical differentiation was impossible, Case E, in which the patient died at the age of 17 years, after an illness of 2½ years, belonged to the group of those suffering from liver cirrhosis. Macroscopically this case was remarkable because of absence of softening or atrophy of the lenticular nucleus. Microscopically, in the corpus striatum a poverty of ganglion cells and increase of small glia cells without fiber formation was noted, also the presence of lattice cells and granule cells. The mesenchymal network was increased, but not the blood vessels. The dentate nucleus revealed degenerated nerve cells and pathologic neuroglia. Nowhere was there evidence of an inflammatory process or of vascular degeneration.

The disease in the other patient (Case H), who died at 15 years of age, ran a course of eight years. The liver was normal. There was a striking atrophy of the caudate nucleus and of all parts of the corpus striatum but most marked in the putamen. A true softening cystic degeneration or cavity formation was not present; only in the outer third of the lenticular nucleus were widened peri-adventitial spaces seen about the vessels. This nucleus presented a considerable increase in glia fibers. The absence of cellular disintegration or presence of any considerable evidence of scavenger cells seemed to indicate that the abnormal process was either arrested or slowly progressing. No changes were present in the dentate nucleus, and the characteristic Alzheimer glia cells were here absent. In the cerebral cortex, however, a most unusual ganglion cell degeneration was found—a pale rounded, often pear-shaped, cell body with broken up nuclear chromatin content. Rod cells and neurophagic glia accompanied the process.

The three cases of typical lenticular degeneration were all characterized by cystic degeneration or marked tissue destruction in the lenticular nucleus, but in all cases the Alzheimer glia cells were found. Glial fiber increase and granule cells from the neuroglia were more or less constant features. Of great significance in these cases was an increase in the smaller blood vessels and a mesenchymal adventitial increase between the blood vessels. The most important fact, however, was the discovery that the pathologic process in Wilson's disease is not so sharply localized as is believed. In these cases changes were found in the cerebral cortex, both of the cell type of Alzheimer and also cystic degeneration resembling that in the lenticular nucleus itself. The dentate nucleus was also found involved.

The author believes that the same disease process is common to both Wilson's disease and to pseudosclerosis and that a differentiation on histopathologic grounds is not possible. He does not believe that either disease is properly speaking a system disease. The writer discusses the nature of the unusual histologic reactions. The article is well illustrated with microscopic reproductions.

SCHALLER, San Francisco

UEBER DIE BEEINFLUSSUNG VON VISIONEN DURCH CEREBELLAR AUSAELOSTE VESTIBULARE UND OPTHALMOSTATISCHE STOERUNGEN (VESTIBULAR AND OPHTHALMOSTATIC INFLUENCES ON VISION [OF HALLUCINATORY NATURE]). A. PICK, Ztschr. f. d. ges. Neurol. u. Psychiat. **56**:213, 1920.

Pick believes that he can show that a series of events which hitherto have been believed to be hallucinations are not of this character but are caused by disturbances originating from the vestibular and ophthalmostatic apparatus. He cites at great length and with minute details the case of an engineer of 61 with a diagnosis of tabes and arteriosclerosis, who was subject to hallucinations in which he in his bed would seem to travel through the walls of his rooms and see double the various phenomena which appeared before him somewhat in the nature of a film with a negative and a positive exposure. The account of the patient's subjective statements regarding his hallucinations must be read in the original to be appreciated. The stories vary from his ability during these attacks to look through the roof, through the walls, to see objects beyond the room as doubled to peculiar contortions, of objects bending forward, contortion of the ceiling, etc.

Necropsy examination revealed a minor degree of atrophy of the frontal lobes, multiple pea-shaped, slightly shrunken brown spots in the nuclei lentiformis and in the dentate nuclei of both hemispheres of the cerebellum. What seemed to be a pigmented scar, microscopic examination showed to be a peculiar glial degeneration.

In the most careful physical examination there is, however, the glaring omission of an examination of the vestibular apparatus, and in the absence of this the reviewer does not see how any conclusion regarding the affect of cerebellar disturbances affecting the vestibular apparatus and having any influence on the double vision and slanting or broken outlines of objects can be drawn.

As the conclusions depended on the statements of the patient, the effect of suggestion by constant questioning cannot be eliminated. Through the entire history the fact that constant questions tending to illustrate whether he saw double, whether the unreal objects or the real objects—both of which appeared in hallucinations—were seen double, all impresses one with the great possibility of his answers being made to conform unconsciously to suggestions given in questions.

The author, in reviewing the voluminous statements of the patient during a long talk, decides that the patient really never saw any visions double, and he always denied having seen them double except in one instance. The author concludes that one is always dealing with cases of hysteria when visions are reported as having been double.

Pick states that we are well aware of similar cases in delirium tremens and know the extraordinary power of suggestion on the character of the hallucinations and visions of the patients.

In the voluminous literature no observation has been made of any cases of visions seen as double in spite of the fact that among these patients were many with an ocular palsy. It would seem quite natural that this should not be so and that there is no connection at all between the two affairs. One is a purely motor and muscular affair, the other a psychic disturbance, and they bear no relation to each other.

He ends the article by drawing attention to the observations of P. Schelder, which are really of great importance and interest. He noticed that a straight line was made to seem to bend forward by cold water irritation of one labyrinth and that it seemed to bend in the opposite direction when this irritation ceased. With the appearance of nystagmus this line seemed to be chopped up into several pieces separated from each other in the horizontal meridian.

In the absence of any vestibular examination in the case that Pick mentions, the importance of the deductions he makes is questionable.

BARKAN, San Francisco.

DIE KLINISCHE BEDEUTUNG DES FACIALS PHAENOMENS IM SAEUGLING- UND KINDESALTER (THE CLINICAL SIGNIFICANCE OF THE FACIAL REFLEX (CHVOSTEK SIGN) IN INFANCY AND IN CHILDHOOD). K. BLÜHDORN, Med. Klin. **16**:1009 (Oct. 24) 1920.

According to Blühdorn, spasmophilia occurs most frequently during the first two years of life. It may, however, occur later, if only as a latent tendency. Attacks are most common in the late winter and in the early spring. Heightened mechanical and electrical excitability are characteristic findings in spasmophilia, while almost pathognomonic is the kathodal opening contraction reaction obtained by stimulation of the median nerve with a current of 5 milliamperes or less. In older children 6 milliamperes should be used as the upper limit of current employed. A reversal of the formula in which anodal opening contraction is greater than anodal closure contraction is also a fairly constant finding. The appearance of kathodal closing tetanus with the above amount of current is pathologic.

As electrical apparatus is not always at hand, it is desirable to avail oneself of any other test which may prove satisfactory. According to the author, the Trousseau sign, while usually positive in spasmophilia, is not as constant as the Chvostek. Some authorities consider the Chvostek a sign of a neuropathic constitution, while others doubt its value. The author believes it to be a constant finding and not varying from infancy to childhood.

In children with rickets or showing other signs of a possible spasmophilia, a positive Chvostek sign and a heightened electrical excitability was obtained in the majority of cases, the Chvostek sign being the more constant. Finkelstein found evidence of latent spasmophilia in 55 per cent. of a group of artificially fed children. It is the author's opinion that latent spasmophilia does not necessarily mean a true spasmophilia; the possibility should, however, be recognized and the parents instructed in the proper care of the child. In an examination of thirty-seven latent spasmophilic children 81 per cent. gave a positive Chvostek sign. According to Blühdorn, the facial reflex or Chvostek sign, as compared with the electrical reactions, is the more lasting.

During, or directly following, a spasmophilic attack, the Chvostek sign may be absent. What the relation may be between the facial reflex and the electrical reactions is still a question in the opinion of the author.

In the review of the author's material, neuropathic tendencies constantly presented themselves, not only in the patient but also in the family. It is his opinion that spasmophilic persons are neuropathic, but that not all neuropathic persons harbor a latent spasmophilia. Spasmophilia was frequently found associated with other nervous ailments, meningitis and encephalitis being mentioned by the author.

The presence of a positive facial reflex in epilepsy is not uncommon and brings up the question of the relation of spasmophilia to epilepsy. It is not uncommon for a spasmophilic person to develop petit mal attacks or attacks resembling them, in which luminal does no good. Narcolepsy also has been observed as a sequel of spasmophilia. In the latter cases a positive Chvostek sign was present, and good results were obtained with calcium therapy. Spasmophiliac patients showing intelligence defects and typical epileptic attacks must be considered as having true epilepsy, and are said by Potpetschnigg to have tetanoid epilepsy.

Teething cramps, whooping cough or convulsions at the onset of fever are indicative of latent spasmophilia, and such patients as a rule show a positive Chvostek sign. In obtaining a history of the patient, it is frequently impossible to get this information as the patient is unaware of the fact and apparently the parents have forgotten the occurrence.

In conclusion, the author discusses the therapy of spasmophilia in which calcium forms the chief factor. Of interest is the fact that in nervous children in whom there is a latent spasmophilia as noted by the Chvostek sign and the electrical reactions, good results are obtained by calcium medication.

MOERSCH, Rochester, Minn.

DISMORFIE CRANICHE DA APLASIA EMICEREBELLARE (CRANIAL DEFORMITIES FROM HEMICEREBELLAR APLASIA). G. MINGAZZINI and F. GIANNULI, Riv. di Antropol. **22**:33, 1918.

Mingazzini and Giannuli, starting from an anatomic study of the brain and skull of a case of fat eunuchoid with hemicerebellar aplasia, have come to some important conclusions on the relationship existing between the morphology of the skull and that of the brain.

Among the many anomalies which the skull of this patient showed, it was found that the opening of the transverse sinus in the left jugular vein was almost obliterated by an anomalous bone formation; and that the anterior, the middle and the posterior clinoid processes were united to one another by osseous bridges which formed three foramina, the anterior foramen opticum, the middle foramen clino-carotideum and the posterior foramen clino-clinoideum. The sella turcica was deep and very narrow, and the marked hyperostosis of the tuberculum ephippii had caused the peduncle of the hypophysis to be choked, a condition which led to the clinical picture of eunuchoidism.

As to the possible pathogenesis of the hyperostosis, the authors, in consideration of the marked thickening of the diploe, particularly that of the right frontal region such as is found frequently in syphilitic patients, think that in this case hereditary syphilis may have been responsible both for the osseous alterations and for the cerebellar aplasia, the latter probably being the consequence of a specific arteritic process of one of the inferior cerebellar arteries and of a branch of the superior cerebellar artery. Probably such syphilitic processes took place during prenatal life, as shown by the fetal characteristics of some internal formations of the occipital bone and by certain features disclosed in the study of the brain.

Another important feature of this skull is the absence of harmonious correlation between its internal and its external morphology. The volumetric valuation of the different cranial fossae, and the study of the serial cuts of the brain indicated that the compression exerted by the left occipital lobe from behind on the middle line toward the right side, had caused deformation of the whole

right cerebral hemisphere. In fact, the right girus hippocampi and the girus fusiformis had been forced to a vertical position between the pulvinar and the lateral ventricle, thus preventing the formation of the retrolenticular segment of the internal capsule.

Compensation on the external formation of the bones so well concealed the disharmonies of the inner surface of the skull cap as to give to this skull, when examined from the outside, a most harmonious morphologic aspect correspondent to the ethnic type of the species. This confirms the fact that the value of the external cranic form is less important than the value of the internal one.

Here the authors report extensively on the anthropometric measurements and give a minute description of the deformities found in the cranial cavity. They give a confirmation to the views expressed by Tedeschi in his craniologic studies, saying that "not always do disturbances of development of portions of the brains, correspond to, in relation of reciprocal dependence, analogous alterations in the corresponding portions of the skull-cap." In view of the tendency shown by Schwalbe to follow the old conceptions of Gall and Moebius, in an attempt to read on the external surface of the skull the sulci of the convolutions, the authors warn against relying too much on the external morphology of the skull. Without denying that such an attempt may lead to some practical results for the cranial surgery, they entertain no hope that the same may be said from the anthropologic point of view, since the fundamental questions regarding the relations existing between the development of the brain and the development of the skull still remain on the solid bases laid by Broca, Gudden, and Virchow.

NACCARATI, New York.

ZUR FRAGE DER ROLLE DES RUCKENMARKS BEI EPILEPTISCHEN KRAMPFEN (THE ROLE OF THE SPINAL CORD IN EPILEPTIFORM CONVULSIONS). M. LAPINSKY, Neurol. Centralbl. **39**:324, 1920.

The author discusses the rôle played by the spinal cord in epileptiform attacks and cites cases of injury or tumors of the spinal cord with convulsive attacks. Brown-Séquard produced the epileptiform attacks in a guinea-pig by stimulation of the spinal cord when the cerebellum, the pons and the medulla were removed. Marsh attempted to repeat these experiments on frogs, but failed. With creatin, Laudois produced some irregular contractions but no regular convulsions, and concluded that the spinal cord plays a passive and conductive rôle in convulsions due to cortical irritation.

The author attempts by experiments to answer these questions: 1. Can one produce epileptiform attacks in frogs by irritation of the spinal cord? 2. Over which spinal tracts may convulsive impulses travel that arise in the cerebral hemispheres or in the medulla?

The first query was studied by stimulation of the lower part of the spinal cord in frogs with creatin, salt and the faradic current after its section at the level of the second dorsal vertebra. In this experiment he was unable to produce any convulsive attacks. The second problem was investigated by making partial section of the cord at the third and fourth dorsal vertebra. Five series of animals were thus treated, the undivided bridge consisting respectively of the anterior, posterior, both lateral columns, one lateral column and one-half of the cord; variable degrees of paralysis and anesthesia in the hind legs resulted.

Convulsive attacks were induced by application of creatin to the cerebral cortex or medulla. The reflex excitability of the cord was elicited by concentrated acetic acid applied to the lower extremities.

From the experimental study, the following conclusions were drawn: First, during convulsions of cortical or bulbar origin that impulse can be transmitted, not only lengthwise of the cord, but also transversely. The longitudinal conduction is accomplished by the anterior and lateral column, and the transverse conduction of impulses from one half of the cord to the other occurs apparently through the gray substance. The transmission of the convulsions through the posterior extremities was not possible, while the transverse conduction was greatly reduced. Second, in all cases in which the upper and lower sections of the cord were joined by a small bridge, the posterior extremities were partially or completely paralyzed; voluntary movements were impossible, but nevertheless, epileptiform convulsions were able to pass. The reflexes in the posterior extremities were either lessened or normal. Third, as the convulsions in the hind legs could be interrupted by stimulation of these parts, while the attack continued its usual course in the fore part of the body, the convulsive excitation of the hind legs was weak, probably because the diameter of the bridge which conducted the impulse was too narrow and the impulse was too slight. Fourth, the insufficient irritation discharge in the posterior part of the spinal cord during the convulsive discharge in the higher centers causes these sections to remain less exhausted, and the reflex excitability to exist during the convulsion. Fifth, the spinal cord cannot originate the epileptiform discharge, but serves only to transmit the impulses which arise in the brain and medulla.

SHELDEN, Rochester, Minn.

A PROPOS DE NEURO-FIBROMATOSES CENTRALES. (CONCERNING CENTRAL NEUROFIBROMATOSIS). E. CHRISTIN and F. NAVILLE, Ann. de méd. **8**:30 (July) 1920.

The authors review the literature of twenty recorded cases and have four well studied cases of their own to add, one with detailed histologic reports.

Generalized central neurofibromatosis is characterized by the presence of multiple neoformations located on the course of the cranial or spinal nerves, or within the medulla, brain proper or meninges.

The histologic structure of these tumors is varied. All the tumors which neuroglia and mesodermic perineural tissues can furnish are represented. Even in a single person, such as in their first case, there may be glioma, fibroma, true neuroma, myxoma, osteoma, endothelioma and sarcoma. The process seems to amount to a teratoid disposition on the part of the tissues. This impression is reenforced by the frequent concomitant occurrence of diverse congenital malformations and even of teratoid tumors properly speaking.

The eighth nerve is almost always involved and usually bilaterally. Among the other nerves, the fourth is the most often affected, and then follow the seventh and ninth and then the third and fifth. The other nerves are rarely involved. These statements relate to the intracranial course of the nerves for, extracranially considered, the fifth and tenth are most often affected.

In sixteen cases in which the author has exact data, the first symptoms appeared prior to the age of 20.

It is necessary to bear in mind the long latent phase which may occur. In one case, deafness was the only symptom over a period of seventeen years, and the only symptom during twenty-five years in another.

Lesions of the acoustic nerves are as signatures of the disease. There was bilateral central deafness in sixteen of twenty-three cases, unilateral in four. Vestibular symptoms are frequent, but not so striking. Equilibrium, even in tests with the revolving chair, was little disturbed in all the cases in spite of the abolition of the labyrinthian reactions to the galvanic current and to water.

This apparent contradictory symptomatology merits exact research. Another feature likewise requiring explanation is the frequent absence of headaches, torpor or somnolence in spite of the size and extraordinary number of tumors present intracranically in some cases (for example, in the authors' case).

There has been a combination of cutaneous neurofibromas with intracranial localization of the process in less than 40 per cent of the cases.

DAVIS, New York.

REPORTS ON PSYCHIATRY. HENRY R. STEDMAN and DONALD J. MACPHERSON, Boston M. & S. J. **183**:579 (Nov. 11) 1920.

Stedman and Macpherson present a résumé of some of the more important and recent psychiatric achievements. Ball,[1] Southard,[2] Cobb,[3] and others have made contributions to our knowledge of psychiatry in its relationship to industrial efficiency. It is interesting to note that a neuropsychiatric survey of fifty-seven employees of an industrial company shortly before a strike showed considerable nervous and mental abnormality and in every instance a psychopathic history. It is an established fact that the preliminary neuropsychiatric examination of recruits was one of the important factors in the production of an efficient army. Industry should not disregard this important lesson of the great war. Two steps which are immediately possible in this connection are: first, the establishment of medicopsychologic laboratories in the employment bureaus of the more important and larger industrial concerns, and, second, the teaching of the principles of psychiatry and psychology to industrial physicians.

Campbell,[4] in a recent paper, analyzed the influence of poor mental hygiene during childhood. Parents and teachers who should be the instruments for the greatest good in this direction are too often ignorant of even elementary child psychology. Thorough instruction in the problems of maladjustment is advocated, especially for the university and the medical student.

Rossi[5] makes a distinct addition to our knowledge of endocrine disorders in the psychoses by his report of nine cases of manic-depressive insanity in which he was able to demonstrate suprarenal insufficiency and produced a favorable therapeutic influence by the exhibition of epinephrin.

Lafora,[6] in presenting fifteen cases of paresis and eight of tabes showing marked improvement under treatment, particularly emphasizes the necessity of early diagnosis. The author states that general paralysis can often be detected before the appearance of clinical symptoms by the application of the Wassermann reaction to 0.2 c.c. of the spinal fluid and the colloidal gold test. Lafora uses the autoserum prepared in vitro by the Byrnes and Ogilvie methods. Four

1. Ball: Am. J. Insan. **75**:521 (April) 1919.
2. Southard: Industrial Management, February, 1920.
3. Cobb: J. Industrial Hygiene **1**:343 (Nov.) 1919.
4. Campbell: Mental Hygiene **3**:199 (April) 1919.
5. Rossi: An. de la Fac. de med., Montevidio **4**:358 (Dec.) 1919.
6. Safora: Rev. neurol. **35**:625 (Aug.) 1919.

or five injections are made by the vein at intervals of from four to six days, 0.01 grain of mercury and arsphenamin. The first intraspinal injection was made with arsphenamized serum, never more than 2 or 3 mg., and the maximal dose ever reached was 4 mg. of mercuric chlorid or 7 mg. of (French) neo-arsphenamin. The intervals were from twenty to forty days, while the injections by the vein were made about twice a week alternating the mercury with the neo-arsphenamin and suspending for two or three weeks at the end of six months.

There were two contributions by neurohistologists: C. von Monakow and S. Kitaboyashasi[7] demonstrated choroid plexus abnormalities in twelve cases of dementia praecox, including hyperemia, scattered degeneration of the villi, amyloid degeneration of the connective tissue, collection of colloid masses within the plexus and interpapillary exudation. From Mott's[8] laboratory comes a study of the testicle in various psychoses with a demonstration of primary testicular atrophy peculiar to dementia praecox.

STRECKER, Philadelphia.

BEITRAG ZUR KENNTNIS DER RUECKBILDUNG VON APRAXIE (CONTRIBUTION TO THE STUDY OF THE RESOLUTION OF AN APRAXIA). HANS SEELERT, Monatschr. f. Psychiat. & Neurol. **48**: 125 (Sept.) 1920.

The author reports a case of carbon monoxid poisoning, in which the general symptoms of cerebral disturbance were accompanied by aphasia and apraxia. Evidence of involvement of motor and sensory paths was slight, and disappeared early. Some disorientation in space was present at first but cleared while the apraxia was still at its height. The case was especially favorable for study because the general psychic and aphasic manifestations cleared up early leaving an uncomplicated apraxia.

The apraxia was of the ideatory type. It was manifested in a gross disturbance in the ability to use objects properly, to make purposive movements and to carry out motions of expression; writing and drawing were impossible. As the condition improved, the ability to write returned. Gradually he regained the ability to use objects properly, to make purposive movements and to carry out motions of expression. Even after this improvement had advanced quite far, he had great difficulty in initiating such movements. The ability to draw, both from memory and by copying, improved last.

In the end everything cleared except his ability to copy. The psychic disturbance had entirely disappeared, so that it could be demonstrated that the difficulty in copying was due to apraxia alone and not to any failure of optical understanding; the patient could recognize and name the object to be copied, could criticize and in a measure correct his unsuccessful attempts, and could hold in memory geometrical figures so as to be able to pick them out of a group. In other words, the afferent optic paths were normal, and a normal optic engram could be formed and retained. The difficulty came in converting the optic engram into the motor act of drawing.

To copy normally, the optic picture must be normal; the sensorimotor functions of the hand must be normal; and the association paths between the optic center and the hand center must be intact. The author believes that in this case the association paths and the sensorimotor area were both involved.

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7. Von Monakow, C., and Kitaboyashasi, S.: Schweiz. Arch. f. Neurol. u. Psychiat. **4**:13, 1919.

8. Mott: Brit. M. J. **2**:655 (Nov. 22) 1919.

As to the anatomic localization, this case would seem to confirm the view that ideatory apraxia is dependent on a diffuse disturbance of the brain.

SELLING, Portland, Ore.

INTRASPINAL TREATMENT IN NEUROSYPHILIS. J. H. MITCHELL, Arch. Dermat. & Syph. **2**:44 (July) 1920.

The author briefly reviews the literature on this subject and reports his own technic and the results he has obtained.

The patients were given an intravenous injection of arsphenamin in the early afternoon, and from fifteen to forty minutes later 100 c.c. of blood were withdrawn. The blood was kept in an icebox, after clotting had occurred, until the next morning. The serum was then decanted, centrifugated and inactivated in the usual manner. After withdrawing about 30 to 35 c.c. of spinal fluid, a like amount of serum was injected. Reactions were not severe and morphia, hypodermatically injected, was sufficient to control the pain. The patients were able to leave the hospital usually by noon of the following day. The efficacy of the therapy was constantly watched and followed by serologic examinations after each injection.

The author employs this method only when patients show evidences of neurosyphilis and do not respond to the intravenous medication. He believes that by this technic many cases can be reached that show persistence of signs and symptoms after fair trial of intravenous medication. As a rule, the intraspinal treatments were given once a month and a course of eight to ten intravenous treatments preceded the intraspinal. In all, fifty-two patients were treated. Statistical study of the twenty patients with paresis treated showed that those who received the greater number of treatments made the best progress; of the twenty-five cases of tabes, thirteen patients improved clinically and have a negative spinal fluid, ten improved clinically but have a positive spinal fluid; of seven cases of syphilis of the nervous system, four patients improved clinically and reached negative fluids, while one case showed a fluid which became negative then returned to positive, and another remained strongly positive.

The paper is interesting from a comparative study of the different methods of treatment of nervous system syphilis; however, no evidence is adduced to show that this modification of the Swift-Ellis treatment, as applied by the author, has any advantages over the various other methods and modifications.

PATTEN, Philadelphia.

THE PIGMENTARY, GROWTH AND ENDOCRINE DISTURBANCES INDUCED IN THE ANURAN TADPOLE BY THE EARLY ABLATION OF THE PARS BUCCALIS OF THE HYPOPHYSIS. P. E. SMITH, Am. Anatomical Memoirs, No. 11 (Oct.) 1920.

This important paper contributes significant data regarding the puzzling questions relating to the functional interrelationships of the different endocrine organs. The anterior part (pars glandularis) of the hypophysis can be completely removed with a minimum of disturbance to other tissues in tadpoles of Rana boylei from 3.5 to 4 mm. long. The animals survive the operation and grow well, thus affording opportunity for various observations and nutritional and pharmacologic experiments.

The hypophysectomized animals are albinos, and the pigmentary changes are carefully analyzed. These albinos exhibit a retardation of growth and do not

metamorphose. It is shown that in the normal animals the growth-maintaining substance is derived from the anterior lobe, and if tadpoles deprived of this lobe are fed on the fresh anterior lobe of the beef they exhibit a nearly normal rate of growth. Since these animals do not metamorphose, their growth extends beyond the normal larval period and, accordingly, they ultimately attain a size in excess of the normal. Extraction of the anterior lobe substance with neither boiling water nor boiling absolute alcohol removes the growth-maintaining substance, but the residues remaining after such extraction, if fed to hypophysectomized larvae, bring their growth rates up to normal.

In larvae deprived of the anterior lobe of the hypophysis all other glands of internal secretion are reduced in size, with the exception of the suprarenal medulla, which is structurally altered and may be slightly enlarged. Early removal of the thyroids, on the other hand, results in enlargement of all other glands of internal secretion, again excepting the suprarenal medulla.

After removal of the anterior lobe of the hypophysis, the posterior lobe is diminished in size, asymmetrical, and atypical in position. Moreover, in these larvae the floor of the infundibulum, normally in contact with the anterior lobe, does not thicken in later development, as does the normal, but remains thin and membranous. These points are indicative of an intimate physiologic relationship between the so-called glandular and nervous parts of the hypophysis.

HERRICK, Chicago.

ACUTE CEREBROCEREBELLAR ATAXIA (WITH REPORT OF CASES). J. P. CROZER GRIFFITH, Am. J. Dis. Child. **20**:82 (Aug.) 1920.

Cerebrocerebellar ataxia is occasionally observed as a manifestation of lethargic encephalitis. Four cases are reported with observations and comments. The first case followed influenza and presented the symptoms of ataxic movements, nystagmus and disordered speech. The second case did not follow influenza but was ushered in by weakness in the left hand, dizziness, staggering to the left when walking, or falling to the left (sometimes to the right), and ataxic movements on the left, all of which improved after a time. On examination, four years after the initial symptoms, the patient showed some ataxia persisting in the left hand and tremors. The third case followed an attack of measles, beginning with internal strabismus, difficulty in talking, dizziness and mental apathy. Later there were nystagmus (constant), tendency to go to the left in walking, or falling to the left, and a Bárány test located a lesion in the upper posterior portion of the pons and anterior superior portion of the adjacent cerebellum; gradual improvement took place, but some months later the patient returned to the hospital with an exaggeration of all symptoms, and with the interim history that the nystagmus and strabismus had persisted. The fourth case possibly followed an influenzal attack. The encephalitis began with vomiting, constipation, stupor and high temperature, followed by convulsive seizures of short duration, coming on at intervals over a period of sixty hours. The coma persisted for several days, and speech did not return for four months or longer. A year after the attack ataxia in movement and slow speech persisted.

The author draws the conclusions that an acute hemorrhagic encephalitis involves the cerebellum more frequently than is often suspected, and when both cerebrum and cerebellum are affected the term "cerebrocerebellar encephalitis" should be preferred. The cause seems to be some infectious disease and

the usual symptoms are: unconsciousness, ataxia, affection of speech, disturbance of mentality, nystagmus, loss of power (sometimes) and persistence of reflexes. As to recovery, he concludes from his own experiences and the reports of others that in the majority of instances recovery will occur, but that it is often delayed and slow.

PATTEN, Philadelphia.

NERVE OVERLAP AS RELATED TO THE RELATIVELY EARLY RETURN OF PAIN SENSE FOLLOWING INJURY TO THE PERIPHERAL NERVES. LEWIS J. POLLOCK, J. Comp. Neurol. **32**:357 (Dec. 15) 1920.

Pollock has previously reported on 1,020 cases of peripheral nerve lesion observed in American military hospitals.[1] In this shorter communication 132 of these cases, which were controlled by operation, are analyzed with exclusive reference to the question of the relation of the phenomena of pain sensibility in areas of nerve overlap to the protopathic type of sensibility as described by Head and his colleagues. He finds that the dissociated return of sensibility of cutaneous pain occurs only in areas of possible overlap. When several nerves serving adjacent areas are severed simultaneously, sensibility to cutaneous pain is not present after injury, nor does it return before tactile sensibility in the borders between these areas where it is usually present when either nerve is severed alone. When a region in the area of sensory distribution of a severed nerve is sensitive to cutaneous pain, and the region is adjacent to another nerve area, if this nerve is severed, complete analgesia results in the previously sensitive region. When sensibility to prick pain is present or returns in the area of possible overlap on to the sensory distribution of the severed nerve, subsequent resection and suture of this nerve does not change the general extent of this sensitive area, although the borders may at times be slightly enlarged or diminished; that is, the pain sense returned or present before the operation was not due to partial regeneration. Because of these observations, it is believed that the early and dissociated return of pain sense attributed by Head to the lawless regeneration of protopathic sensibility is due to the assumption of function of adjacent and overlapping nerves.

HERRICK, Chicago

SYMPTOMATOLOGY OF SPINAL CORD TUMORS. ISADOR ABRAHAMSON and HYMAN CLIMENKO, J. A. M. A. **75**:1126 (Oct. 23) 1920.

All cases of transverse myelitis with progressive symptoms should be regarded with suspicion and thoroughly studied, particularly as to level signs. The symptoms and signs of soft intramedullary growths are somewhat different from the hard tumors, the motor and sensory symptoms showing considerable parallelism in contrast to the stationary and earlier motor symptoms of the hard tumors. Xanthochromia is more common in soft tumors, and root symptoms more frequently are bilateral. Pain is present in all soft intramedullary tumors that reach the posterior roots, or the surface of the cord, but this may be a late happening, while in extramedullary growths the symptoms develop more rapidly. Tract sensory signs and trophic changes are more common in intramedullary growth, but rectal and vesical signs are less frequent.

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1. Pollock, L. J.: Overlap of So-Called Protopathic Sensibility as Seen in Peripheral Nerve Lesions, Arch. Neurol. & Psychiat. **2**:667 (Dec.) 1919.

When no distinct level can be established, the effect of lumbar puncture should be carefully watched and operation only undertaken when a definite level is determined. The possibility of soft tumors in atypical cord lesions must be kept in mind. For determination of actual site of tumors certain signs have proved to be of value: (*a*) root signs, which consist of neuralgic pains with symptoms pointing to a distal distribution of an affected nerve; (*b*) zones of hyperesthesia immediately above the seat of the tumor and more marked at the homolateral site; (*c*) level abolition of skin and tendon reflexes; (*d*) deep spinal tenderness; (*e*) alteration in vibratory sense; (*f*) no sweating below the level after injection; (*g*) ocular symptoms, such as lateral nystagmus and difference in the pupillary size, as well as palpebral fissure, which may all be present in high cervical tumors. The less reliable signs are: (*a*) homolateral paralysis; (*b*) heterolateral distribution of pain and temperature sense which reach their highest level only after considerable cord compression, late in the disease; (*c*) this sensory loss when complete is usually three segments below the actual level of the tumor.

Operations, frequently by their decompressive effects, help even in intramedullary tumors.

PATTEN, Philadelphia.

LES RECHERCHES EXPERIMENTALES SUR L'ENCEPHALITE AIGUE EPIDEMIQUE (EXPERIMENTAL RESEARCH IN ACUTE EPIDEMIC ENCEPHALITIS). P. HARVIER, Rev. de méd. **37**:353 (June) 1920.

The author reports his results in experimental inoculation of animals with epidemic encephalitis. The virus utilized came from the nerve centers of a woman of 45, who died from the disease on the ninth day. Fragments of gray substance, taken aseptically from the cortex, midbrain and medulla were triturated in normal saline.

The following conclusions are given: The virus of epidemic encephalitis is filtrable and is preservable in glycerine. Also, it maintains virulence after desiccation.

The virus is pathogenic for the rabbit and is inoculable into the rabbit by several routes, intracerebral, intra-ocular, by way of the peripheral nerves and by the nasal membrane, preferably scarified.

The virus is not pathogenic for the monkey or guinea-pig when it is obtained directly from man, but becomes so after several passages through rabbits. It differs, therefore, in this from the virus of poliomyelitis which is directly pathogenic to the monkey but not at all for the rabbit or guinea-pig.

There is no crossed immunity between poliomyelitis and encephalitis, and the serum of patients convalescent from encephalitis has no neutralizing action on the virus of poliomyelitis.

DAVIS, New York.

UEBER DAS VERHALTEN DER KNIEBENGER BEI DER ISCHIADICUSLAHMUNG (THE BEHAVIOR OF THE HAMSTRINGS IN SCIATIC PARALYSIS). D. GERHARDT, Neurol. Centralbl. **39**:3226 (May) 1920.

The author discusses vital resistance of the individual muscles when the motor nerve is damaged. The order and degree of susceptibility in the sciatic injury is the peroneal, anterior tibial and hamstring groups. He recorded a case of pachymeningitis lumbalis with loss of reflexes and paralysis of all the muscles of the legs, except the hamstrings and adductors.

Necropsy examination revealed an extradural inflammatory exudate in the region of the seventh and ninth dorsal vertebrae. The spinal cord showed a slight infiltration and degeneration of the root zone. The plantar reaction was absent; however, active contraction of the adductors and hamstrings was induced by plantar stimulation. Similar contractions were induced by passive movement of the legs backward and also by percussion of the quadriceps tendons, but the quadriceps failed to react. All muscles showed a prompt response to faradic stimulation.

This case substantiates the author's previous observation that by paralysis of the sciatic group, irritability of the peroneal and the tibial muscles may be lost, while that of the biceps group is retained. That the inflammation process was uniform over the lower part of the cord was indicated by the anatomic appearance, as well as the paralysis of the group above and below the biceps group. Although the biceps group is anatomically more closely associated to the peroneal and tibial group, yet physiologically it is in relation to the adductors, and its resistance to inflammatory attacks is also greater.

SHELDEN, Rochester, Minn.

UEBER ALTERNIERENDE FAZIALISLAEHMUNGEN (RECURRING FACIAL PALSY). KURT BOAS, Neurol. Centralbl. **39**:567-571, 1920.

The author has assembled various studies showing that single recurrences in facial paralysis occur in from 3 to 7 per cent. Bernhardt collected sixty cases in which the patients had recurrences; 66.6 per cent. with a single recurrence, 31.6 per cent. with two recurrences, five with three recurrences and one with four, comprised the total.

He reports the case of a man, aged 30, who in 1906 developed right facial paralysis. A few days previous ten teeth were extracted from the right upper jaw. A few days later, the left facial nerve became paralyzed. The facial diplegia continued for about eight weeks, leaving slight bilateral ticlike twitchings. In 1913, following a short exposure during a car ride, he developed complete left seventh nerve paralysis, with recovery in four weeks.

Only so-called idiopathic cases are here considered. Several combinations of facial monoplegias and diplegia are recorded. Bernhardt deems a year interval as essential for a genuine recurrence. The shortest interval reported was twelve days, the longest eighteen years.

The author considers the bilateral ticlike twitchings as an evidence of overirritability, viewing it as a predisposition toward paralysis. A favorable prognosis is the rule, this benignity being associated with favorable electrical reactions. Whether narrow fallopian canals or unusually vulnerable facial nerves are responsible, he is uncertain, but favors the latter theory.

SHELDEN, Rochester, Minn.

TONSILLECTOMY ON THE RECURRENCE OF ACUTE RHEUMATIC FEVER AND CHOREA: A STUDY OF NINETY-FOUR CHILDREN. W. ST. LAWRENCE, J. A. M. A. **75**:1035 (Oct. 16) 1920.

The author reports a study of 94 children, 85 of whom presented one or several of the manifestations of rheumatic conditions, and 58 of these suffered from organic heart disease. The cases were under observation from two to six years following tonsillectomy. The tonsillar conditions were variable, 13 per cent. markedly hypertrophied, 69 per cent. moderately so, and not enlarged

in 18 per cent.; recurrent inflammatory attacks were noted in 73 per cent., and recurrent "sore throat" in 7 per cent. after the removal of the tonsils; there were 20 per cent. of reoperations because of incomplete removal. The tonsillar lymph nodes were enlarged in 100 per cent. before operation and impalpable in 59 per cent. after operation. One or more attacks of rheumatic fever had occurred in 42 cases before tonsillectomy and there was no recurrence in 35 cases (84 per cent.) after the operation. Sixty-one cases showed myositis, bone or joint pains before the operation and no recurrence afterward in 47 cases (77 per cent.). Of the 58 patients with organic heart disease, 12 had suffered at least one attack of cardiac failure, with but one recurrence in 1 case after operation. Chorea was associated with rheumatic manifestations in 32 cases out of 40. In 3 cases chorea was the sole rheumatic manifestation, and attacks did not recur after operation, although on the whole the effect of tonsillectomy on the recurrence of chorea was not as definite as on other rheumatic manifestations. Forty cases showed recurring attacks of rheumatic fever before operation and no recurrence in twenty (50 per cent.) afterward.

PATTEN, Philadelphia.

NEURITIS OF THE CRANIAL NERVES IN LETHARGIC ENCEPHALITIS AND THE DIFFERENTIAL ANATOMIC DIAGNOSIS BETWEEN IT AND ACUTE POLIOMYELITIS. MONTROSE T. BURROWS, Arch. Int. Med. **26**:477 (Oct.) 1920.

This is a complete clinical and pathologic report of three typical cases of lethargic encephalitis studied intensively as regards the pathology of the cranial nerves. The findings in the brain correspond to those described in all other cases in the literature, but in addition a special study is made of the cranial nerves. In the first case there was found a neuritis of both oculomotor and trochlear nerves and the right acoustic nerve; in the second case a neuritis of the optic, oculomotor, trochlear, trigeminal, abducens, facial and acoustic nerves, and in the third case a neuritis of the optic nerves, both oculomotor, left trochlear, both trigeminal and both acoustic nerves. Apparently the nerves involved bear no relation to the clinical symptoms. The author then gives his findings in more than fifty necropsies of acute anterior poliomyelitis in detail and sums up: "The difference pathologically, therefore, between lethargic encephalitis and poliomyelitis is evidently not to be found in the minute histology of the central nervous system but rather in the distribution of the lesions, the absence of marked edema and swelling of the spinal cord and the changes in other organs and tissues. . . . The neuritis of the cranial nerves, on the other hand, forms apparently a more distinctive difference."

WINKELMAN, Philadelphia.

EVOLUTION ET ASPECTS CLINIQUES DE LA DIPLEGIE FACIALE (EVOLUTION AND CLINICAL ASPECTS OF FACIAL DIPLEGIA). A. DE CASTRO, Rev. neurol. **26**:80 (Nov.) 1919.

De Castro believes facial diplegia to be a much more frequent clinical occurrence than is commonly supposed, particularly the acquired peripheral type. He divides this type into two general classes, namely, facial diplegia observed in connection with polyneuritis and simple facial diplegia developing per se.

The first type is frequently found in association with polyneuritis of syphilitic origin and generally manifests itself after the extremities have become involved, affecting both sides of the face simultaneously or after an interval of several hours. The second type occurs almost entirely on a syphilitic basis (95 per cent.) and generally during the third or fourth month after infection. The paralysis develops on one side first, affecting the other in the course of several days, and is, as a rule, most severe on the side initially attacked. At any given time, it is rare to find both sides equally affected, nor is recovery usually symmetrical. The period required for recovery varies from a few days to several months. Postparalytic tic and contracture are relatively rare sequelae and, if present, are generally unilateral.

RAPHAEL, Kalamazoo, Mich.

LA PRESSION ARTERIELLE CHEZ LES EPILEPTIQUES (BLOOD PRESSURE IN EPILEPTICS). P. HARTENBERG, Presse méd. **28**:748 (Oct. 20) 1920.

Arterial pressures were taken with the Pachon instrument in eighty cases of idiopathic epilepsy. A few persons regularly showed hypotension or hypertension, but these departures from normal were not more frequent nor more marked than might be discovered in any other neuropathic group.

A number of attempts had been made by other writers to find some constant relationship between blood pressure variations and seizures of grand or petit mal. From this series no formula could be deduced. Whether a subject's usual pressure was high, low or average, it exhibited no behavior in the hours or minutes immediately antecedent, or subsequent, to an attack that could be construed as typical or pathognomonic. The pressure might rise or fall before an attack; it frequently fell afterward, but this was explicable by fatigue. Blood pressure studies of epilepsy apparently did not assist in clearing up questions of pathogenicity or of therapy.

HUDDLESON, New York.

NEUROPATHIC KERATITIS SETTING IN LONG AFTER ALCOHOLIC INJECTIONS INTO THE GASSERIAN GANGLION FOR RELIEF OF TRIGEMINAL NEURALGIA. CHANCE, Arch. Ophth. **49**:621.

The patient had had alcohol injected into the gasserian ganglion, April, May and June, 1916. In February, 1917, both the supra-orbital and infra-orbital branches of the trigeminal nerve were resected, and a few days later alcohol was again injected into the ganglion.

Almost three years later he developed edema of the cornea, with slight pericorneal and conjunctival injection, which condition the author attributed to the last injection of the ganglion with alcohol because it was not until the last injection that the patient was relieved of his tic.

From December, 1919, when first seen by the author, until May, 1920, the cornea of the left eye had become edematous, shed its epithelium and returned to normal three times. The iris was only slightly involved, and only a faint interstitial haziness remains at present.

The length of time intervening between the injection of the ganglion and the appearance of the keratitis was considered unusual by the author.

SCARLETT, Philadelphia.

EXPERIMENTAL OBSERVATIONS ON THE HISTOGENESIS OF THE SYMPATHETIC TRUNKS IN THE CHICK. ALBERT KUNTZ and O. V. BATSON, J. Comp. Neurol. **32**:335 (Dec. 15) 1920.

Various views are current regarding the source of the nerve cells which form the sympathetic ganglions. Some maintain that they are derived from peripheral mesenchyme, some that they migrate outward exclusively from the spinal and cerebral ganglions, and some that they arise from both the ganglions and the neural tube, in the latter case migrating outward along the ventral roots. The authors tested this last point by removing the neural crest and dorsal part of the neural tube in chick embryos before the sympathetic ganglions were formed. Sympathetic ganglions of approximately normal size are developed in the absence of spinal ganglions and dorsal nerve roots, provided the remnant of the neural tube is relatively large. The conclusion is that sympathetic neuroblasts do migrate out from the neural tube along the ventral roots, though migration in normal development from the spinal ganglions is not excluded.

HERRICK, Chicago

TRANSIENT HERPETIC RASH OVER THE AREA OF THE DISTRIBUTION OF THE OPHTHALMIC BRANCH OF THE FIFTH NERVE, FOLLOWING APPLICATION OF BLUESTONE IN A CASE OF PARINAUD'S CONJUNCTIVITIS. MATHIAS LANCKTON FOSTER, Arch. Ophth. **49**:621.

This article describes a typical case of Parinaud's conjunctivitis in a boy 14 years of age, with turgid mass of acuminate growths in the upper fornix. The area was treated with bluestone. Almost immediately a rash followed, resembling a fresh attack of herpes, over the left side of the forehead, sharply delimited by the median line. There was no pain or hypersensitiveness of the skin. The rash disappeared in two hours.

Another application of bluestone in three days was followed by a less marked eruption. Subsequent applications were followed by less severe eruptions until they ceased to appear.

SCARLETT, Philadelphia.

THE USE OF THE THERMOMETER IN MENTAL DISEASES. E. D. BOND, Boston M. & S. J. **183**:550 (Nov. 4) 1920.

In this day of refinements in diagnostic procedures, simple and established methods are apt to be neglected. Bond calls attention to the wealth of information which is to be gained from the habitual employment of the clinical thermometer in psychiatry. Of seventy-one consecutive hospital admissions, including all of the more common forms of mental disease, more than 50 per cent. showed a distinct febrile reaction. It is interesting to note that in manic-depressive psychoses the proportion of fevers reached almost 70 per cent. and in dementia praecox only 40 per cent. A group of seven "fever" patients making a transition from an undoubted infective state to a frank mania reveals a closer symptomatic relationship than is ordinarily expected and suggests a toxic agent as instrumental in the production of manic-depressive symptoms. In his recent annual address the president (Dr. S. DeW. Ludlum) of the Philadelphia Psychiatric Society remarked that on the first day of admission, patients in the psychopathic wards were so prominently stamped with the general signs of toxicity that it was practically impossible to venture a definite

psychiatric opinion until the various eliminative channels had been set into motion. "Toxicity" like "shock" is a much abused term, but surely fever is to be regarded as presumptive evidence of its existence.

STRECKER, Philadelphia.

UEBER PUPILLENNYSTAGMUS (PUPILLARY NYSTAGMUS). LUDWIG and SCHILDER, Neurol. Centralbl. **39**:561-576, 1920.

The author deals with an exceedingly rare combination of rhythmical contractions of the pupils, synchronous and associated with nystagmus. In a case of encephalitis with bilateral external rectus paralysis, pupillary nystagmus, convergence nystagmus and twitching of orbicularis oculi were bilateral and synchronous. A woman, eight months pregnant, with eclampsia, awakened with right hemiplegia, dysarthria and a complicated combination of ocular paralyses and nystagmus. With a vertical nystagmus in the left eye was associated a left pupillary nystagmus. In both cases the lesions were assumed in the tracts from Dieters' nucleus to the nuclei for the eye muscles.

Hippus is usually unattended by nystagmus although the association of both has been observed.

SHELDEN, Rochester, Minn.

CLINIC ON THE DIAGNOSIS AND TREATMENT OF NEUROSYPHILIS. H. C. SOLOMON, Boston M. & S. J. **183**:723 and 768 (Dec. 23 and 30) 1920.

The lessons to be drawn from Solomon's clinic on the diagnosis and treatment of neurosyphilis are that the central nervous system is involved comparatively frequently in both primary and secondary syphilis, but this involvement is ordinarily benign; a small proportion of meningitic and vascular syphilis occurs during the second stage; the proportion of neurosyphilis, tabes, paresis, meningitis, meningo-encephalitis, gumma and vessel disease may be placed at 10 per cent.; diagnosis is most uncertain without the aid of serology, and there is often a positive reaction in the spinal fluid long before definite symptoms are present; syphilitic meningitis, acute meningo-encephalitis and mild vascular conditions usually respond favorably to intensive intravenous therapy but in general the intraspinal method is superior.

STRECKER, Philadelphia.

PARALYSIS OF THE EYE MUSCLE AFTER ALCOHOLIC INJECTIONS FOR TRIGEMINAL NEURALGIA. J. FEJER, Am. J. Ophth. **4**:123 (Feb.) 1921.

The author cites two cases in which ocular paralyses followed alcoholic injections, in the first case the abducent being affected and in the second, the oculomotor nerve. In the first case the injection was made in the region of the right malar bone and in the second in the region of the left supra-orbital notch. The author states that alcoholic injections are not so free from danger as Prof. Pichler maintains, and that many cases of neuroparalytic keratitis and atrophy of the nerves have been described in the literature.

REESE, Philadelphia.

Society Transactions

NEW YORK NEUROLOGICAL SOCIETY

The Three Hundred and Eighty-Fifth Regular Meeting, Jan. 4, 1921

WALTER TIMME, M.D., *President, in the Chair*

CASE OF LETHARGIC ENCEPHALITIS WITH UNUSUAL OCULAR SYMPTOMS AND NEARLY BILATERAL IMMOBILITY. DR. B. ONUF.

Dr. B. Onuf presented a case seen by him in his consulting service at Ellis Island, and diagnosed as lethargic encephalitis with resulting bilateral ophthalmoplegia and a slight titubation of gait, besides some muscular disturbances, of which later he expressed some doubt whether they were the result of the encephalitis or due to a juvenile muscular atrophy.

The data of anamnesis are somewhat meager: While coming from Italy to the United States, patient was taken with headache and what he called weakness of the lower extremities, being unable to stand and walk without support, and for three days he wanted to sleep day and night. He had also loss of appetite, but no fever. On Dec. 22, 1920, he was admitted to the Immigrant Hospital on Ellis Island, where Dr. Faulkner and Dr. Brown recognized the ophthalmoplegia and swaying gait and referred the case to the speaker for further neurologic examination and opinion. The patient on admission showed a slight elevation of temperature.

Neurologic Examination.—A neurologic examination was made on Dec. 24, 1920. The patient presented an ophthalmoplegia of both eyes. The eyeballs appeared to be quite immobile. Only when the patient looked into the mirror was there a slight convergent movement of both eyes, the right eye also moving slightly outward when following the mirror to the right side, while in the left eye only the convergent movement was noticed. There was a slight ptosis of the left side, but none on the right. Pupils showed slight inequality—the left was smaller than the right. Some light response was present in both eyes, but decidedly diminished in extent. Accommodative response was practically absent. Consensual reaction present in the right eye, but diminished, and was still more diminished in the left eye. There was no distinct asymmetry of facial innervation, but occasional twitchings on either side, more of the character of choreic tic than peripheral twitchings. The tongue was put out straight and showed no atrophy. The speech was of somewhat nasal character and was a little indistinct. The gait was swaying, with no preference to one side. There was a slight Romberg sign. The patient could not walk on a straight line on the floor, heel to toe. Knee, ankle and wrist reflexes were absent. The epigastric reflex was present on both sides and was fairly lively. The cremasteric reflex was slight on both sides. Plantar reflex caused flexion of the small toe and the one next to it on either side. The motor power of upper extremities was well preserved but there was a slight deviation in the index to index pointing test with eyes closed, also the index to nose

pointing test. There was slight adiadokokinesis. Touch, pain and localization were preserved everywhere. No areas of hyperalgesia were present. There was a slight degree of winged scapulae and lordosis which disappeared on sitting down. There was no pronounced atrophy of any group of muscles.

Mental Condition.—The patient appeared serious, perhaps slightly depressed, but prompt and to the point in all his answers to sensory tests. He gave promptly the day of the week, month and day of month. He said he was in a hospital, and that he came there two days ago (correct). He was intelligent and cooperated well.

Eye Grounds.—He had no optic neuritis, but the disks were perhaps slightly grayer on the temporal side.

Examination.—About 12 c.c. of cerebrospinal fluid were withdrawn by lumbar puncture. The fluid was clear and under normal pressure. This was made by Dr. R. P. Sandidge. It revealed: cell count, 4 cells per c.mm.; globulin, slightly positive; Wassermann reaction, negative. Dec. 30, 1920, the Wassermann test of the blood was reported negative. The urine was amber in color, acid, with a specific gravity of 1.025; no albumin; no sugar. Jan. 4, 1921: Blood count, by Dr. J. F. Paulonis, showed: red blood cells, 4,800,000; white blood cells, 7,800; polymorphonuclears, 71 per cent.; small mononuclears, 23 per cent.; large mononuclears, 4 per cent.; eosinophils, 2 per cent., and hemoglobin, 95 per cent.

In conclusion, Dr. Onuf expressed his gratitude to the medical staff of Ellis Island for the help given in working up this case and for the privilege of presenting it to the society.

DISCUSSION

Dr. I. Abrahamson said that at present he knew of no lethargic encephalitis cases, except chronic and remitting cases. Poliomyelitis and poliencephalitis were in existence, presenting certain features of poliencephalitis, but belonging to the group of poliomyelitis. Severe and complete ophthalmoplegias were unusual in lethargic encephalitis. The loss of knee jerks might be either of spinal origin or from lesion in Deiter's nucleus. The history of unsteady gait would indicate that the case might fit into the latter category. He had lately seen patients in whom there had been lethargy and diplopia, and finally total focal paralysis, whose cases he regarded as poliencephalitis.

Dr. Walter Timme said that there had been a recrudescence of lethargic encephalitis early in December. In the case presented, the number of cells was small for poliomyelitis.

Dr. B. Onuf stated that he had thought of poliomyelitis, but the history of the lethargic condition decided him in favor of encephalitis. The patient had been taken ill on the boat coming from Italy, which might make a difference in the possibility of the condition being lethargic encephalitis.

DYSPITUITARISM WITH HYPERTENSION. Dr. E. David Friedman.

Dr. Friedman presented a student, aged 19, who for nine years had shown dwarfism and obesity, hypertension, and recently, recurrent pains in the region of the spine. The lad was the third of seven children. The parents and one sister were short and stout. One brother suffered from petit mal. The patient's history included measles and scarlet fever, but it was not known

whether the kidneys were involved at that time or not. The birth was normal and development normal up to the age of 9 years when he began to grow stout. There had been little gain in height since that time. The abdomen became pendulous, the fingers stubby, the feet remained small and the face became ruddy. Thyroid extract was administered in 1915 for over a year, and he grew 2 inches in height. The treatment was then stopped. The patient felt well and went to college. About six months ago he complained of shooting pains in the region of the spine and chest. Examination of the urine showed "kidney involvement." When presented he had shortness of breath and palpitation of the heart after exertion. Speech was somewhat hesitant and some impairment of memory had made itself apparent. Dimness of vision had been reported during the last two months and occasional headaches. There was nocturia but no polydipsia.

The physical examination revealed a short, obese man, 136.5 cm. in height (normal for his age, 175 cm.); the weight was 46.4 kilograms. There was erythema of the face and a pendulous distended abdomen. The teeth were somewhat spaced, the approximation poor, the lateral incisors projecting at a marked angle. The pupils and fields were normal. No sclerotic changes of the vessels of the fundus were reported. There were two pinpoint hemorrhages in the left fundus at one time. The thyroid was not enlarged. Examination of the lungs was negative; the heart was somewhat enlarged to the left and the aortic second sound was accentuated. The blood pressure was increased to systolic, 198; diastolic, 110. The genitals were small. There was an overgrowth of hair at the bridge of the nose, and the body was covered with fine lanugo hairs. The only pathologic neurologic findings were the slightly diminished deep reflexes, which may possibly be accounted for by the existant glycosuria and hyperglycemia. Other laboratory findings were normal. There was perforation in the septum of the nose, and the tonsils were moderately enlarged. The skin was dry and presented three distinct peculiarities: ringworm of the axilla and pubis, erythema and telangiectasis of the face, and striae distensiae of the abdomen. Roentgen-ray examination showed undeveloped sinuses, the left being opaque. The lower molars were unerupted and impacted. Examination of the skull revealed a normal sella. The posterior clinoids, as well as the bones of the body and sphenoid bones were markedly atrophic and thin. A dense shadow was seen in the middle fossa, and a shadow at the root of the neck, extending up from the aorta, probably due to the large vessels. The roentgenograms of the hands showed bony development, such as is usually seen in a person of 13. Epiphyseal lines were still present. Libido was absent. The urine showed glycosuria. An electrocardiogram showed a left ventricular preponderance, and there were tachycardia and sinus arrhythmia. There was slowing of the rate on holding the breath and after vagus pressure. A slight alteration of the size and shape of the pulse wave revealed instability of the cardiac pacemaker. There was an unstable vagus and sympathetic balance. Intramuscular injection of atropin and pilocarpin produced no striking results. Epinephrin was not tried on account of the high blood pressure. The conjunctival epinephrin test of Loewi was negative. The title for the presentation was chosen to indicate the predominating features; but other glands were involved as well. The stunted growth points to a deficiency of the morphogenetic principle of the anterior lobe of the pituitary gland. The glycosuria and the hypertension might be interpreted as a hyperactivity of the posterior lobe. (The absence of a pathologic blood chemistry aside from the increased blood sugar and the presence

of a normal phthalein output would seem to exclude true interstitial nephritis.) The hypertrichosis and the increased cholesterin content of the blood indicate some involvement of the suprarenals. The dry skin and delayed ossification of the bones show that the thyroid was not functioning normally. Reichmann[1] has designated a new pituitary syndrome differing from the two characteristic types hitherto described, hyperpituitarism producing acromegaly and hypopituitarism causing the dystrophy adiposogenitalis of Frölich. Reichmann's case resembles ours very much with the exception that his patient showed exophthalmos and bradycardia instead of the tachycardia seen in this case.

DISCUSSION

Dr. Walter Timme asked whether the abdominal viscera had been examined. Dr. Friedman replied that with the exception of the palpation for the liver, the edge of which could just be felt, no examination had been made. Dr. Timme also asked whether the shadow of the chest had been considered from the point of view of a possible thymus shadow, to which Dr. Friedman answered that this point had been carefully considered and the possibility excluded. There was an absence of relative lymphocytosis characteristic of thymic cases. It was of interest, Dr. Timme also noted, that the genitals showed lack of differentiation.

Dr. E. D. Friedman, in closing, said that the treatment had consisted of anterior lobe pituitary and thyroid extract for the past six months without any real change. The patient had received thyroid extract more or less constantly since 1915, the dosage varying from one-half to one grain three times a day.

JUVENILE TABES AND CASE REPORT TO ILLUSTRATE THE CONDITION. Dr. Charles Rosenheck.

Dr. Rosenheck sketched the development of the recognition of juvenile tabes as a distinct clinical entity from the day when Remak first reported three cases in 1885 and cited a discussion ten years earlier.

The difference between juvenile tabes and Friedreich's hereditary ataxia was not always apparent to earlier observers, and Hildebrandt first called attention to the error, drawing the distinction between such cases and those that might be considered true juvenile tabes. The diffidence of observers in accepting juvenile tabes as a true clinical entity is thought to have been due to the fact that up to 1910 no necropsy examination had been recorded to prove the existence of such a disease process.

The various factors that create the syndrome in the young and the respects in which it differs from the accepted orthodox type as observed in the adult are: The average of incidence is placed at 15 years. Mingazzini and Baschieri-Salvadori report an onset at 3 years of age as the youngest recorded case. Hereditary syphilis is responsible for the development of tabes in the young in the majority of cases. A few cases of infection in infancy are reported. According to Cantonnet's analysis, nearly twice as many females as males are affected, a striking reversal of conditions obtaining in later life. The mode of onset in a large number of cases was an early visual difficulty rapidly proceeding to optic atrophy and blindness. The percentage of this form of onset

1. Reichmann: Deutsch. Arch. f. klin. med. **130**: Nos. 3 and 4.

is much higher than in adults. Lancinating pains come next in order of frequency, 25 per cent. of the patients showing these as compared to 70 per cent. of adult patients. Bladder disturbances and gait defects were observed in fewer cases. Cantonnet remarks that ataxia in juvenile tabes is conspicuous by its absence, and the absence of marked gait disturbances in the tabetic blind has been commented on by all writers on the subject. Crises and girdle-like pains have not been observed at any time, nor have trophic phenomena been reported.

Thorough neurologic study renders the diagnosis a matter of simplicity. Cerebrospinal syphilis and Friedreich's ataxia are the only conditions that simulate it to any serious degree. Scoliosis, foot deformity, pyramidal signs, nystagmus, speech defects, etc., are never found in tabes, however; and the syndrome of cerebrospinal syphilis is somewhat different.

A young woman, 18 years of age, was next presented. She was the second of five living healthy children. Pupillary inequality was observed at the age of 12 by a school physician, and she was advised to wear glasses. The first subjective disturbances appeared at the age of 15 and took the form of severe lancinating pains. This was the only symptom for two years. Paresthesias, variable in character but always affecting the lower extremities, principally the toes, have been noted in the past year. There have been no visual difficulties during the period of the development of the malady. Examination of the patient revealed no abnormal attitudes of the voluntary motor system. The gait was somewhat disturbed by an ataxia which varied. In general, all coordinative activity was performed in a fairly creditable manner. Skilled test acts showed no gross defects. Deep reflexes were completely abolished; superficial reflexes were present and equal. No pathologic reflex could be elicited. The peripheral neural apparatus showed no pathologic alteration or impairment. Examination of the cranial nerves revealed that the pupils were fairly regular, markedly unequal and not responsive to light. Accommodative and consensual reactions were likewise abolished. The fundi showed a narrowing of the larger vessels and indistinctness of the smaller ones; the disk was grayish and showed clear evidence of early atrophy. Systemic examination revealed general deficiency in growth and development. Hutchinsonian teeth were present. Laboratory examination showed a positive blood Wassermann reaction. The spinal fluid contained 130 cells per c.mm.; globulin was increased; the Lange colloidal gold reaction was 5544334555, in addition to the positive Wassermann reaction. The prognosis in general, Dr. Rosenheck said, after summarizing the main conclusions reached, was excellent for life, but extremely poor for vision.

DISCUSSION

Dr. D. J. Kaliski (by invitation) said that he wished to supplement the report by findings in an interesting case recently seen. There had been no diminution in vision until about the middle of last August, when the patient had suddenly become blind. Investigation showed that there had been symptoms soon after birth, but no treatment had been pursued after the child was 1 year old. There were many stigmas present, such as hutchinsonian teeth, complete optic atrophy, the Argyll Robertson pupil, which also reacted sluggishly, a positive Wassermann reaction and a positive cerebrospinal fluid. Cells were not greatly increased, but there was increased globulin, and a paretic curve resulted with gold solution. The child was becoming more and

more unruly, and the outcome will probably be taboparesis. A similar case was seen four or five years ago, in which the signs of tabes were clear. Taboparesis developed, and the patient died.

Dr. Rosenheck said that such cases were so rare, his being only the second that he had seen in twelve years, and the first certain one, that he regretted that fuller discussion had not been opened.

Dr. Abrahamson said that it would be interesting to study the endocrinous glands in the patient's family, to try to determine why one child was affected and the others spared.

Dr. Timme remarked that the girl showed numerous glandular disturbances, and the teeth especially were very small.

INCIDENCE OF ALCOHOLIC AND SYPHILITIC PSYCHOSES. Dr. George H. Kirby.

Dr. Kirby drew attention to the fact that until recently one often encountered the statement that alcohol and syphilis together were responsible for from one quarter to one third of all cases of mental disease that required hospital treatment. During the past decade there have been certain developments which must exercise great influence on the prevalence and potency of these two important causes of mental disorder.

There can be little doubt that during recent years there has been a general movement against the intemperate use of alcohol. The federal prohibition amendment is but one indication of this movement. A striking reflection of this trend against inebriety is seen in the admission rate to the Bellevue Hospital alcoholic wards for the past eleven years. During this period the total number of cases of acute or chronic alcoholism (exclusive of the psychotic types) was 75,333. The high point was reached in 1910 when nearly 32 per cent. of all admissions to Bellevue Hospital were diagnosed as cases of alcoholism. Since then there has been a persistent decrease, the low point being reached in 1918 when a little over 6 per cent. of the cases were diagnosed as alcoholism. A slight upward turn of the curve in 1919 was due to a relative falling off of the general admissions to the hospital. The actual number of alcoholic cases in 1919 was less than in 1918. The figures for 1920 are not yet available, but preliminary estimates show a smaller number of cases than in 1919.

Dr. Kirby regarded the continuous decline in the ratio of alcoholic cases as all the more significant when one takes into consideration the increasing population of New York and the fact that there has been apparently no important shifting of alcoholic patients to other hospitals or institutions for treatment.

The percentage distribution of alcoholic psychoses admitted to all of the New York state hospitals also shows a decline for the past twelve years. A marked fall has occurred from the high point in 1908 (when nearly 11 per cent. of the state hospitals' admissions were diagnosed as alcoholic psychoses) to less than 2 per cent. in 1920. It was thought that the diminishing number of alcoholic psychoses reported might be accounted for in part by a change in diagnostic attitude; but the separate listing of the Korsakoff cases, which presents little room for diagnostic error, gave a curve which showed a decline similar to that for the other psychotic types.

Turning to the syphilitic psychoses, Dr. Kirby remarked that during the past ten or fifteen years a number of forces and influences have come into play which may possibly be lowering the incidence of syphilis as a disease or modi-

fying its later manifestations, especially the neuropsychotic forms. During recent years the public interest in syphilis, its prevention, consequences and treatment has been vastly increased. The therapy of syphilis has been revolutionized since the introduction of arsphenamin in 1910, and the lessened amount of alcoholism may perhaps also be reckoned as a favorable influence. Possibly it is too soon to expect to see results on account of the time which usually elapses after the infection before neurosyphilitic lesions become manifest.

Dr. Kirby showed a chart drawn up from state hospital data on cases of paresis admitted during the past twelve years. The ratio of these cases has held fairly uniform at about 13 per cent. of the total admissions. There has, however, been a slight fall during the past two years from the relative high point of 13.4 per cent. in 1918. Moreover, by using the recent census and calculating the rate of paresis per hundred thousand of the state's population, it appears that there has been a decline from 9 per hundred thousand in 1918 to 7.9 in 1920, the lowest figure on record. The actual number of cases of paresis admitted to the hospitals has also declined since 1918. This reduction may be somewhat significant in view of the steady increase in the population of New York State.

The data at hand would seem to justify the conclusion that alcoholism has declined perceptibly in recent years, and coincident with this decline there has been a marked fall in the number of alcoholic psychoses.

Mental disorder (paresis) due to syphilis reached a high point in 1918 with a subsequent decline in the relative and actual number of cases entering the hospitals.

DISCUSSION

Dr. L. Pierce Clark opened the discussion of Dr. Kirby's paper with the suggestion that since dermatologists so frequently report that they see the early signs of syphilis at skin clinics, this would seem an excellent field for therapeutic work. If preventive workers would concern themselves with the earlier stages of the disease better prophylaxis would be obtained.

Dr. B. Onuf asked how the diminution in syphilis and alcoholism has affected other psychoses. He thought it would be interesting to find out whether substituted drug habits, if such occurred, would also result in psychoses.

Dr. L. P. Clark asked whether the information collected by Dr. Kirby might not be turned over to mental hygiene publications so that the reading public might have correct data concerning the incidence of alcoholic psychoses and syphilitic psychoses and the relative decrease.

Dr. B. Onuf said that Dr. Brill had spoken of a case of alcoholism treated by psychanalysis with entire cure. The patient then proceeded to forge checks, so that Dr. Brill did not feel proud of his achievement and thought that the patient might have been better off as a drunkard. Dr. Onuf also said that Dr. Gregory had reported a recent great increase in cases of alcoholism admitted to Bellevue.

Dr. Irving J. Sands said that his experience at Bellevue would lead him to believe that there was no such thing as a new form of psychosis resulting from prohibition. Furthermore, he stated that he had discussed that question with Dr. Barnes, and many of the older men who had charge of the alcoholic service in years gone by, and it was their impression that the old alcoholic repeaters were not now coming to Bellevue with a psychosis. It was true

that admission in general to the psychopathic ward was increasing, but that was due to other factors, and not to prohibition. He felt that prohibition had helped considerably.

Regarding the problem of general paralysis, he felt that the early recognition of neurosyphilis and the favorable impressions made by intensive treatment on mesodermic syphilis helped materially to lessen the number of paretic patients. He referred to Dr. Gregory's work on the modern conceptions of inebriety, which was published in 1917.

Dr. D. J. Kaliski (by invitation) asked whether the decrease in paretic admissions to state hospitals had been brought about by the increase in facilities for treatment in other institutions. The state hospitals used to be the only refuge. Now more widespread and better known treatment centers and clinics, and the increase in treatment in private practice may have helped to lessen the admissions.

Dr. Kirby, in closing the discussion, said that he had seen no signs that other psychotic types were appearing as substitutes for alcoholic psychoses. The total admissions to the state hospitals have diminished, due, he thought, chiefly to the falling off of alcoholic psychoses. There has been no increase of drug psychoses; in fact, the number admitted to the state hospitals has decreased, although drug psychoses have always formed a relatively small group among the admissions to the state hospitals.

The suggestion that the decline in the number of syphilitic psychoses admitted might be due to more frequent treatment of these cases in general hospitals and in private practice, especially early cases of paresis, should be taken into consideration. Dr. Kirby did not feel, however, that this factor would modify greatly figures for the entire state over a period of years, unless actual curative results were being obtained in the treatment of early neurosyphilis. Unfortunately, experience shows that many cases of paresis that have been treated in general hospitals or in practice eventually reach state institutions.

REMARKS ON CONSCIOUSNESS IN THE EPILEPTIC FITS. Dr. L. Pierce Clark.

The ordinary definition of the epileptic fit, Dr. Clark said, is a loss of consciousness with or without a convulsion. This accepted loss of consciousness, Dr. Clark finds, from patients' reports, to be questionable. One patient states: "When a petit mal occurs, I can usually control myself and go on talking or continue whatever I am doing. . . . There is a sort of turmoil in my mind. This would last only a second." Another says: "I feel intensely aware of myself." A third patient reports: "During the confused spell I have a feeling that I must not let any one know there is anything unusual, and that I must retain my poise at all costs. . . . Consciousness so far as outside affairs are concerned is suspended and my attention is directly turned in on myself." Another patient says: "I could always control these attacks if I really wanted to, but I let them come up. It was a gratification, I think, to something inside me."

From these statements, Dr. Clark infers that instead of there being a loss of consciousness in totality, the subject consciousness is increased. Awareness of surroundings may be greatly or entirely lost, but there is in its place heightened awareness of self. In more severe epileptic reactions the person may not be able to report his subject awareness; but from his appearance and manner it is apparent that he is in a state like that experienced by persons

able to record twilight states. Still more complete submergence of self to a condition resembling that of birth or earliest infancy is met with in deeper grades of disordered consciousness. The patient may answer questions and will always answer in disjointed sentences in the optative mood, such as "I am trying to," "I'd like to," etc.

The state of epileptic reaction, then, said Dr. Clark, is an involution of the normal development of consciousness. This latter is gradually evolved out of egoconsciousness to a rich combination of subject and object consciousness or to a unified composition of both. The epileptic reaction then has an enormous psychic importance, principally in the deteriorating influence on the power of sustained interest and attention, and the orderliness of normal objective life. Each attack refreshes and satisfies the patient's cruder egoconsciousness and enriches his egoistic interest. It is therefore to be expected that he will not be interested in recovering from his disorder and in foregoing his unconscious self gratification. To appeal to him, his personal satisfactions in everyday life must be increased beyond those obtained from his habit.

DISCUSSION

Dr. John T. MacCurdy thought that Dr. Clark had brought out an important clinical point in regard to the mental state of many epileptic patients. He agreed with Dr. Clark that particularly in cases with a prolonged aura a heightened sense of personal awareness was a frequent phenomenon. This is well illustrated in the account of an epileptic attack given by Dostoevsky in the "Idiot." On the other hand, Dr. MacCurdy wished to take exception sharply to Dr. Clark's contention that such heightened sense of awareness was in opposition to the loss of consciousness so generally recognized as pathognomonic of epilepsy. He insisted that consciousness was used in two senses. In the sense in which Dr. Clark was now using it, it meant a direction of attention to the patient's own ego. Clinically, however, consciousness usually means the reciprocal function of attention to the environment—objective consciousness, as Dr. Clark said. With any weakening of consciousness in the clinical sense there was always a tendency to an increase in the attention to the patient's own personality. In fact, this is the essence of introversion. A good example is seen in the normal phenomena of dreams. In them there is usually a heightened sense of the dreamer's personality, while objectively the subject is unconscious.

Dr. Gregory Stragnell (by invitation) said that in discussing the consciousness of the epileptic patient, the conscious, introverted attitude of the patient must be looked on as an escape from his obligations. It would hardly be analogous to unconsciousness. Two characters, famous in history, who were addicted to epilepsy, Napoleon and Dostoevsky, illustrate this. From the journals and letters of both of these, it is seen that both at about the age of 12 wrote home and threatened to simulate insanity to compel the state to look after them if they were not forthwith supplied with funds to maintain the position which they felt was their due. Each of these men found a compensation for an initial inferiority and the same form of retreat in later life when the carrying out of the compensation became too difficult. The mechanism in each of them was first the recognition of an initial inferiority of the ego which the one sought to compensate for by war, the other by literature; and if the

struggle became too difficult, they sought a retreat in the epileptic attack. This should give a clearer concept of the struggle going on in the consciousness of the person.

Dr. C. P. Oberndorf said that epilepsy was caused by many things and cured by many things. The term epilepsy does not mean very much. All stages of it may exist. In using the term, every form of convulsive attack is included. A case seen recently was that of a woman 42 years of age, the mother of ten children, who has attacks daily. In her case the epileptic attacks were due to an organ deficiency. Unless Dr. Clark can limit idiopathic epilepsy, due to a special type of physical disorders, his discussion will lead too far afield. To draw up a psychogenetic group will be undertaking something too misleading and will confuse the therapy.

Dr. Irving J. Sands said that he considered Dr. Clark's contributions to the epileptic problem epoch making, and that all students of mental disorders were indebted to him. However, epilepsy, in his opinion, was an organic condition, and the fit was caused by the reaction of the brain to some stimulus. In his opinion there were definite structural (cerebral) alterations, macroscopic, microscopic or physiochemic in nature, caused by endogenous or exogenous toxins. He had had an opportunity to conduct an intensive study of epilepsy at the Manhattan State Hospital. The results obtained there by the administration of proper drugs convinced him all the more that epilepsy was an organic condition. In May, 1919, when sedatives, such as chloral, bromids, hyoscin and paraldehyd were used in controlling the psychotic epileptic patients, there were 502 recorded seizures; while in May, 1920, after the system of luminal therapy had been worked out, there were only eight seizures in the same ward. He stated that he had been able to follow up this therapy in Bellevue Hospital, where many of the epileptic patients had been sent because of some postepileptic unfavorable complications, and there too had obtained satisfactory results on that drug. There was no doubt but that psychogenic factors played an important part in many of the epileptic patients, especially in those having epileptic equivalents. Recently he had seen a case which might well fit into the group described by Dr. Clark. It was that of a 28 year old woman, a nurse, of unusual intelligence and ability, who was in charge of a big ward of mental cases. For the past four years she had been having attacks lasting one or two days, once every six months or so, which had been characterized by intense hemicrania, nausea, vomiting and scintillating scotomas. She was seen two weeks ago in one of these attacks. She left the ward suddenly, packed her trunks and cabled that she was coming home. She had had intense unilateral headache, nausea, vomiting and scintillating scotomas characteristic of migraine. After three days she felt greatly relieved. She stated that during this time she had thought only of herself, had had a sense of heightened self consciousness, and felt that several distressing conflicts that had been troubling her for a few weeks had been solved. She also added that all the other attacks would come on whenever confronted by some perplexing problem, and following these attacks she felt a sense of security in employing the mode of procedure indicated by her subconscious trend. This case Dr. Sands regarded as more or less of an epileptic equivalent associated with migraine.

Dr. B. Onuf inquired concerning the relation between the injuries sustained during the attacks, and the theory of the wish of the person to escape from consciousness and to return to intra-uterine life.

Dr. Clark closed the discussion by stating that he emphasized time and again that he considered there was a definite group of essential epilepsy exclusive of groups involving organic conditions. He had always limited his remarks to cases in which no specific cause could be found. The epileptic fit essentially does not differ from conditions seen in the psychotic ward, and is a pure retreat to gain a certain result. Essential epilepsy is a mental disease with physical objective manifestations. Any diagnostic critique must keep this in view. It has been practically agreed that essential epilepsy may be considered a definite clinical phenomenon.

In replying to Dr. MacCurdy's comment, Dr. Clark said the sleep phenomenon was analogous but not parallel. As to medication, speaking from his own experience, he felt that luminal was probably the most insidious and destructive drug we have ever used. Its disastrous effects can be appreciated only after several years, whereas bromids reveal the harm they do on the surface after a short period. Luminal is deadly because of its character deterioration. It is worse than bromid medication since the mere stoppage of the drug does not do away with apparent deterioration, as in taking away bromid after prolonged use.

Epileptoid attacks, tabetic convulsions, etc., do not concern the idiopathic group. Their pathology may have been demonstrated, but until we obtain more data, every possible investigation should be continued.

COLORADO NEUROLOGICAL SOCIETY

Regular Meeting, Jan. 22, 1921

Howell T. Pershing, M.D., *President, in the Chair*

Dr. Pershing thanked the Society for the honor of being chosen its first president; he predicted for the organization success and the accomplishment of much good for those interested in neurologic work.

A draft of the constitution and by-laws was presented and adopted.

ANXIETY NEUROSIS. Dr. George E. Neuhaus.

Dr. Neuhaus gave a brief review and history of anxiety neurosis as viewed originally by Freud and his successors, calling attention to the prominent characteristics which identified this clinical state. Four cases were reported, all of which were traced to sexual complexes, instancing recovery when the complexes could be brought out as the result of psychanalysis.

DISCUSSION

Dr. Samuel Goldhammer referred to the cardiac type, comparing this to the neurasthenic, postinfluenzal and "gas" types, as observed in the army.

Dr. Edward W. Lazell said that the followers of Freud were making the same mistake as the older observers, and that while Freud was a clinician, that the phenomena he himself observed were not thoroughly interpreted. Quoting Kempf further that "the hormone is the messenger of the mind and not of the body," he expressed an opinion that all anxieties were regressions and the basis of the physical symptoms were the glands of internal secretions. Overcompensation of inferiorities is the chief cause of anxiety.

Dr. C. S. Bluemel thought the type of individual was too often overlooked. Sexual complexes, he thought, were probably as frequent in other states if looked for.

Dr. Howell T. Pershing believes that these patients are subject to fear without a rational cause for the fear. All of us have the inherited mechanism which makes possible the development of fear. That these anxiety cases become especially sensitized depends on a neurotic inheritance, and some accident, shock or dynamic illness sets the matter off. Among the many other causes, the sexual may become operative, and in any such case the person may revert to what are regarded by him as errors, or indiscretions of youth in the same way as it may be developed in melancholia.

EPIDEMIC ENCEPHALITIS. Dr. Edward Delehanty.

Dr. Delehanty spoke generally of the epidemic of encephalitis, referring to the wide discussion given the subject. In his opinion, it was a new disease; he had no recollection of seeing similar syndromes in previous years of practice. Several cases were related of rather atypical course.

DISCUSSION

Dr. Philip Work reported having seen six cases in which the pleocytosis ranged from twenty to sixty. In one of his cases a typical bulbar paralysis developed with a rapid course.

Dr. Howell T. Pershing referred to the previous epidemic of encephalitis in which he recalled cases which were regarded at that time as cases of meningitis; when the patients recovered the true nature of encephalitis was identified. He was impressed by the diversity of symptoms in the present epidemic. His first case resembled a Landry's type of paralysis until recovery began to appear in the reverse order—that is, the face recovered first. Another case was mistaken for melancholia; later a typical bulbar complication led to a correct identification. The third case appeared to be a poliomyelitis. Choreic and mental cases were also mentioned. The relationship of influenza is doubted.

Dr. George A. Moleen called attention to a syndrome which he thought might be a form of noninflammatory hemorrhagic poliencephalitis. He had found only one reference in the literature to this syndrome—this appeared in the *Revue Neurologique* under the caption "Syndrome of Tapia." Three cases were mentioned in all of which the left side was involved. A striking characteristic of all cases was the severe pain over the trigeminal area extending back to the occiput, which precedes the degenerative symptoms. This has been so severe as to have led to attempts at suicide in two instances. Shortly after the appearance of pain, atrophy was noticed in the same half of the tongue with marked furrowing and fibrillary twitching (of which photographs were shown); paralysis of the soft palate, the vocal bands and more or less weakness of the muscles of the neck was common in all cases. The paralysis of the ipsolateral vocal band was absolute. In one case only was strabismus noted. In one case there was a previous syphilitic basal meningitis from which the patient had recovered and negative Wassermann reactions of the blood and serum had obtained for a year; this was also true in the case reported from Brazil in the French literature. The other cases mentioned were free from syphilitic evidence. The treatment was similar to that for acute infec-

tions—symptomatic for the most part and with free alkalinization and elimination. Complete recovery is the rule with the restitution of the tongue and restoration of the vocal power.

SAN FRANCISCO NEUROLOGICAL SOCIETY

Regular Meeting, Feb. 4, 1921

MILTON B. LENNON, M.D., *President*

A CASE OF SUBACUTE MYELINIC DEGENERATION. DRS. E. W. TWITCHELL and R. W. HARVEY.

Drs. Twitchell and Harvey related the case of a man 52 years old with negative venereal history. In 1918 he had a severe attack of influenza. Four years ago he began to have tingling and a clammy feeling in his hands and feet. When examined on Aug. 15, 1920, he was so weak that he could not walk without a cane. Marked ataxia of the hands and feet was present. The tendon reflexes in the arms were diminished; those in the legs were absent. The lower abdominal reflexes were absent; the cremasteric reflexes were present but feeble. Blood count: red blood cells, 2,660,000; white blood cells, 5,800; hemoglobin, 82 per cent.; there were moderate poikilocytosis and anisocytosis. The blood Wassermann reaction and all spinal fluid tests were negative. A month later the patient was unable to stand or to feed himself. His hands ached so that he "wished they could be cut off." The entire body was very sensitive. In spite of this increasing weakness, the red count went up to 4,760,000 after a course of Fowler's solution and two doses of neo-arsphenamin. The patient died on Oct. 2, 1920.

DISCUSSION

DR. G. Y. RUSK reported that the brain showed a diffuse atrophy involving both frontal lobes and adjacent portions of the parietal and temporal lobes. The spinal meninges were normal, but on section the posterior columns showed a broad V-shaped brownish-yellow area of degeneration. Farther up the presence of chronic inflammatory changes suggested the possibility of syphilis in spite of the negative serology.

DR. E. S. DUBRAY, speaking from the internist's standpoint, said that he did not know of any particular group of cases that bring the internist, neurologist and psychiatrist so closely together as the group of which this case was an example. He discussed the spastic, ataxic and mixed forms and called attention to the fact that a review of all of the primary anemia cases at the Mayo Clinic had revealed the presence of neurologic signs in 80 per cent. The most valuable clinical sign that rules out syphilis is a stocking and glove anesthesia. He also cited a case of the kind under discussion which first had been thought to be one of multiple sclerosis.

DR. J. N. WOLFSOHN related a case of this disease in an alcoholic woman, seen by him in 1914, when he made a diagnosis of multiple neuritis. Three years later her symptoms persisted and blood examination revealed a red cell count of 800,000, with a color index of 1.4. After four months of arsenic therapy the red count rose to 4,000,000, but she had a flaccid paralysis with a positive Babinski sign and other features of beginning sclerosis of the cord.

Dr. W. F. Schaller said that he had frequently found cases of this disease. In 1917 he reported twenty-three cases with four necropsies in which the central nervous system was studied. None of his cases showed the unusual findings of this case, consisting of the perivascular and meningeal infiltrations rather than the cortical changes. His patients presented paresthesias rather than the pain complained of in this case. Many cases of this disease do not show anemia; frequently they show a high color index. Dr. Schaller said that when he has a patient with a spastic paraplegia and impaired sensibility, he watches the blood closely. He believes that if these patients are seen early enough something can be done for them. He tries arsenic and iron and colonic flushings, on the theory of intestinal intoxication. He said that he did not know of any disease that is so difficult to diagnose as combined sclerosis.

Book Reviews

PLASTIC SURGERY OF THE FACE BASED ON SELECTED CASES OF WAR INJURIES OF THE FACE, INCLUDING BURNS. With Original Illustrations. By H. D. GILLIES, C.B.E., F.R.C.S., Major R. A. M. C., Surgical Specialist to the Queen's Hospital, Sidcup. With Chapters on The Prosthetic Problems of Plastic Surgery by CAPT. W. KELSEY FRY, M. C., R. A. M. C., Senior Dental Surgeon, Queen's Hospital, Sidcup, and Remarks on Anesthesia by CAPT. R. WADE, R. A. M. C., Assistant Anesthetist, St. Bartholomew's Hospital. Cloth. Price, $15. Pp. 408, with 844 illustrations. New York: Oxford University Press, 1920.

This admirable book deserves careful reading and study by every worker who is interested in plastic surgery. Major Gillies, as our readers know, took a leading part in bringing about the splendid results that were attained in the treatment of injuries of the face and jaws in England during the latter years of the war. It was largely due to his efforts and enthusiasm that patients requiring plastic repair of the face were gradually concentrated at Sidcup, where, with the assistance of his co-workers, the methods and success detailed in this volume were achieved.

Certain principles on which the author lays emphasis in his first chapter are so important that they will bear repetition, since they represent the essential considerations on which his work is based. They are: first, the necessity of making an accurate diagnosis at the very outset, by careful examination and palpation, by intra-oral and intranasal examination, by radiographic exmination, and finally by an approximate reconstruction of the original on a plastic cast of the injured face; second, the importance of preserving normal tissue in its normal position until it is possible to attempt permanent repair; third, the avoidance of scar tissue formation, during the period immediately following injury, by suturing mucous membrane to skin about the border of large defects involving mucous cavities; fourth, the necessity of providing a lining membrane in reconstructing cavities which are normally lined with mucous membrane. Failure to observe the last principle, particularly in the reconstruction of the nose, will inevitably lead to failure, no matter how satisfactory the results may appear immediately following operation.

Concerning the implantation of foreign substances the author says, "The use of any foreign body is to be condemned whenever it is possible to substitute a graft from the patient himself." Metallic plates, celluloid plates, injection of celluloid, wax and paraffin have all been tried and found unsatisfactory. The use of bone grafts has gradually been restricted to the repair of defects of the mandible and malar bone. For cartilage the author has found an ever widening field of usefulness—in the reconstruction of the nose, in restoring the contour of the cheeks, of the forehead, etc. He says, "Cartilage, for large cosmetic purposes, stands unrivaled. It is available in sufficient quantity, is easily fashioned to the desired shape, and . . . remains permanently in the shape and size in which it is embedded."

The technic of covering raw surfaces, of providing skin flaps, and of the use of the Esser epithelial inlay is taken up in detail. The introduction of the latter, the author believes, marks a new epoch in plastic surgery and offers possibilities for wider application.

Separate chapters are devoted to repair of the cheek, injuries of the upper lip, injuries of the lower lip and chin, prosthetic appliances, injuries of the nose, injuries in the region of the eyes and ears, and the application to civil surgery of methods developed during the war. Of these chapters, that devoted to injuries of the nose deserves special attention. The author emphasizes particularly the basic principles that underlie successful work: provision of an external covering, a supporting structure, and a lining membrane. Only when all three are provided can failure be avoided. The technic of embedding the structural framework in flaps before transposing the flaps themselves is well illustrated.

A wide variety of illustrative cases has been selected in the discussion of the treatment of different types of injuries, and the technic of operation has been detailed with diagrams and admirable illustrations. The types of injury described are so varied that the surgeon who is confronted with specific problems will find valuable suggestions and assistance for his own work as he reads these pages.

This volume stands as a mute but powerful argument for a league to end war. As long, however, as wars continue, the art of surgery and the wounded will owe much to the industry and imagination of men such as the author and his colleagues.

SLEEP WALKING AND MOON WALKING. A MEDICO-LITERARY STUDY. J. Sadger, M.D., Vienna. Trans. by Louise Brink. Nervous and Mental Disease Monograph Series, No. 31. Pp. 138. New York.

In this monograph Dr. Sadger has attempted to discover the cause and meaning of these phenomena of sleep: the motor responses to dreams. He uses as sources for his conclusions one exhaustively analyzed case, one case in which the sleep walking element was a minor one, three cases quite briefly described, and three autobiographic accounts. This, the clinical part of the book, occupies the first forty-four pages; part 2, almost 100 pages, with the exception of a couple of pages of résumé and conclusions, is taken up with an analysis of episodes of sleep walking found in the literature of fiction and drama. In the clinical part there are long quotations from conversations between the patient and the doctor tending to show the causal relation between infantile sexual memories and sleep walking. There is also evidence adduced showing the relation of the moon to the light borne by the parent visiting the baby's crib. In the first case analyzed the patient was able to remember pretending to be asleep and walking to the parents' bed, a thing she later did in her sleep. She pretended to be asleep so that she would not be held responsible. The sleep walking served the same purpose. The analysis of sleep walking shows how unconscious, one might also say instinctive, is the necessity of mankind to escape a sense of responsibility. It is this necessity which creates much of the conflict resident in the sexual problem. In the tales analyzed in the second part of the book the same principles are found; a gratification of impulses for which the individual would escape responsibility, a uniformly sexual character of these impulses and a tendency for them to refer back to childhood. The erotic character of infantile urination is touched on in the first case analyzed and indicates the line, according to the author, along which investigation of the problem of nocturnal enuresis of the adolescent is to be followed. Acceptance of Freud's theory of dreams is a prerequisite to a sympathetic reading of Sadger's exposition, and there is much in the book that only psychanalytic devotees will accept. To believe that an

infant of 1 year is sexually stimulated by mere contact with the mother and that this is remembered in adult life, would be difficult for one not a Freudian disciple. To base the assertion of "expulsion of a secretion from the cervix uteri" during supposititious sexual erethism in a child of 2 years, on a statement of the patient grown to be a neurotic woman, does not appeal to the ordinary neurologist.

The introduction and analysis of works of fiction to aid in proving a scientific hypothesis doubtless will surprise and fail to appeal to the ordinary medical reader; to a follower of the psychanalytic school the value of this sort of work is conceded. The inherent difficulty of getting any person's mind to follow associations that are bound to lead to embarrassing or distressing self-revelations is avoided by an author who follows such associations in his own mind, but tags them with the name of one of his characters. Dr. Sadger's work deserves the careful reading of any one interested in an attempt to deliver the mental side of medicine from the realm of the mystical according to the conceptions and methods of the Freudian school.

The translation is generally clear but the English is often quite Teutonic in construction.

DIAGNOSE DER SIMULATION NERVOESER SYMPTOME AUF GRUND EINER DIFFERENTIALDIAGNOSTISCHEN BEARBEITUNG DER EINZELNEN PHAENOMENE. Ein Lehrbuch für den Praktiker von PROF. SIEGMUND ERBEN, M.D., Wien. Mit. 25 Textabbildungen und 3 Tafeln. Zweite, vielfach ergänzte und erweiterte Auflage. Pp. 254. Berlin: Urban & Schwarzenberg, N. Friedrichstrasse 105 b. Wien., I. Maximilianstrasse 4, 1920.

The first edition of this monograph appeared in 1912 and was based on a course of lectures to medical officials and physicians of workmen's beneficiary societies (Kassenärzte), the author stating that "for the majority of practitioners the detection of simulation has become very important." So far, in this country, the detection of simulation has not been a very important function of the general practitioner but with the generalization of workmen's compensation laws, it remains to be seen whether or not simulation will become an everyday affair.

Naturally the author's task falls into three parts: means of detecting simulation of (1) organic disease, (2) functional disease and (3) psychoses.

This task Professor Erben has performed very well. In the preface and first chapter he intimates that he will clearly show how to distinguish simulation from functional nervous disorder, and this he does about as well as any one can—which is to say not well at all.

As indicated by the title, the subject is approached through the signs and symptoms belonging to each disease or disorder considered, and then these are contrasted with the findings in simulation. What is perhaps equally important, the author shows how simulation frequently is correctly assumed.

The first chapter is on nervousness and neurasthenia and is principally an exposition of the symptoms shown by the neurotic. Considerable stress is laid on the author's "vagus sign" as indicative of the hypersensitiveness of nervous people. With the head strongly inclined forward, the patient squats (niederhocken) when the pulse quickly slows; on rising the rate slowly increases to above the normal. This is repeated five or six times. The result is more striking if the pulse rate has first been raised by exercise. This sign is said to be valuable in distinguishing functional from myocardial tachycardia. Many

other excellent tests are given for deciding between organic disease and functional disorder but very little to help one to separate simulation from hysteria.

The chapter on pain and hyperesthesia is excellent, containing many helpful hints on a subject always difficult and in medicolegal cases often most perplexing. Here, too, the author notes some organic things (Bernhardt's "laborer's pain, flat foot") apt to be overlooked. For the detection of simulated tenderness, the tests of Müller, Mannkopf-Runpf, Parrot and Selligmüller are given, with the opinion that if they are positive there is tenderness, but that if they are negative, tenderness cannot be excluded.

There is a good discussion of backache, sciatica and other leg pains and anomalies of carriage and gait. Coming from the home of Bárány, one would expect the book to cover vertigo and dizziness. It does, in twenty-two pages.

The trained neurologist and the experienced industrial doctor will find in this work little that is new, but these specialists are not numerous. Other practitioners will find much with which they are not familiar and much to help them out when the occasional medicolegal case or returned soldier claiming recompense turns up.

Evidently the work is based on extensive experience and earnest work, but aside from a number of citations from Charcot, the valuable contributions of those outside of Austria and Germany are conspicuous by their absence.

A TEXTBOOK OF PHARMACOLOGY AND MEDICAL TREATMENT FOR NURSES. By J. M. Fortescue-Brickdale, M.A., M.D. (Oxon.), M.R.C.P. (Lond.); Captain, R. A. M. C. (T. F.); Physician to the Bristol Royal Infirmary and Clinical Lecturer in the University of Bristol; Formerly Lecturer on Pharmacology in the University of Oxford. Pp. 371. London, Henry Frowde, Oxford University Press; Hodder and Stoughton, 20 Warwick Square, E. C. 4.

This book was written for the purpose of explaining to nurses the principles of medical treatment and is divided into two parts. In the first section, devoted to pharmacology, an attempt is made to convey in "simple terms" the known facts regarding the action of various drugs on the animal body. The second section deals with the treatment of disease.

While there is much that is commendable in the work, there is, unfortunately, much to be criticized. To discuss chlorids, bromids and iodids under the heading of chlorin, bromin and iodin, is not in keeping with up-to-date pharmacologic teaching. Again and again the author describes medicinal products that are not in general use or that are of no therapeutic value. This is entirely out of place in a book intended for nurses, for whom an acquaintance with the really useful drugs is all that should be required. On the other hand, nothing is said about dosage of drugs, a subject that nurses surely ought to know something about.

Likewise, in the section devoted to treatment, the author's tendency to encyclopedic diction is to the fore. But one misses explanations as to the nature of the diseases discussed, which is, of course, not really required in a book purely devoted to therapeutics; but what need has a nurse for a study of pure therapeutics?

To present the facts of a science simply, interestingly, and in a manner suitable for those who require or desire merely a general introduction to a subject, is an art mastered by comparatively few. Fortescue-Brickdale is not one of these.

COMMON INFECTIONS OF THE KIDNEYS WITH THE COLON BACILLUS AND ALLIED BACTERIA, BASED ON A COURSE OF LECTURES DELIVERED AT THE LONDON HOSPITAL by FRANK KIDD, M.B., B.C. (CANTAB.), F.R.C.S. (ENG.), Surgeon to London Hospital; Surgeon-in-Charge of Genito-Urinary Department, London Hospital; Member of the International Society of Urology; Membre de l'Association Française d'Urologie. With an Additional Lecture on the Bacteriology of the Urine by Dr. Philip Panton, Clinical Pathologist, London Hospital. Pp. 314. London: Henry Frowde, Oxford University Press; Hodder and Stoughton, 20 Warwick Square, E. C. 4, 1920.

This book is based on a series of lectures delivered by the author and deals with the common infections of the kidney, as well as infections of the prostate and testicle, about one half being devoted to the kidney. It is written in the author's usual clear, concise manner and gives the present-day views regarding the various lesions under discussion. The theoretical considerations are included in one chapter, an arrangement of distinct value in this type of book which, as the author says, is to serve the busy practitioner. The histories of cases on which the book is based are given in an appendix.

In his consideration of the treatment of the various types of colon infections of the kidney the author differentiates between those calling for surgical treatment, which he states comprise a small group, and those suitable for nonoperative management. The author is very much in favor of treating cases of colon bacillus pyelitis by means of pelvic lavage with silver salts. Much emphasis is laid on accessory treatment in these infections, such as proper attention to the gastro-intestinal tract, regulation of the diet, warm underclothing, etc. He does not believe that vaccines are of value, laying great stress on the administration of liberal doses of alkalies.

The chapters dealing with blood-borne infections of the prostate and testicle are well written, and attention is called to the possibility of infections in these organs being due to organisms other than the gonococcus. Failure to recognize this fact results many times in patients being falsely accused of having gonococcus infections.

Fifty cents each will be paid for the April and May, 1919, issues of the ARCHIVES OF NEUROLOGY AND PSYCHIATRY. Address to American Medical Association, 535 North Dearborn St., Chicago, Ill.